



INTERNATIONAL EUROPEAN UNIVERSITY

**EDUCATIONAL AND PROFESSIONAL PROGRAM:
SOFTWARE ENGINEERING**

First (Bachelor) level

Specialty: 121 Software Engineering

Knowledge area: 12 Information Technology

Educational qualification: Bachelor of Software Engineering

APPROVED

**By the Decision of the Academic Council of
International European University
dd. May 30, 2024, protocol No. 6
Chair of the Academic Council,**

_____ Oleh PADALKA

**Educational and professional program
becomes effective by the Order of the
Rector of International European
University**

dd. June 7, 2024, No. 41-OD

Kyiv 2024

INTRODUCTION

The Software Engineering educational and professional program of the first (Bachelor) level of higher education, specialty: 121 Software Engineering, is developed according to the Law of Ukraine On Higher Education dd. July 1, 2014, No. 1556-VII (as amended and supplemented), Resolutions of the Cabinet of Ministers of Ukraine: Approval of the National Qualifications Frameworks dd. November 23, 2011, No. 1341 (as amended by the Resolution of the Cabinet of Ministers of Ukraine dd. June 25, 2020, No. 519), About Approval of Licensing Conditions for Conducting Educational Activities dd. December 30, 2015, No. 1187 (as amended).

The educational and professional program is based on the Higher Education Standard of Ukraine in the specialty: 121 Software Engineering, knowledge area: 12 Information Technology, of the first (Bachelor) level of higher education approved and put into effect by the Order of the Ministry of Education and Science of Ukraine No. 1166 dd. October 29, 2018.

The educational and professional program stipulates the background for access to study, focus and key focus, the amount of ECTS credits required to gain a Bachelor's degree, the list of general and specialized (professional) competencies, the normative and variable content of student training specified in learning outcomes terms and requirements for higher education quality control.

The educational and professional program is developed by the working group of International European University, consisting of:

No.	Full name	Place of work, position
1	Oleksandr Nesterenko (guarantor of the educational program)	Doctor of Technical Sciences, Professor, Head of the Department of Information Technology of International European University
2	Oleksandr Falovskyi	PhD in Technical Sciences, Associate Professor at the Department of Information Technology of International European University
3	Zoia Sherman	PhD in Physics and Mathematics, Associate Professor, Associate Professor at the Department of Information Technology of International European University

External stakeholders involved in the development of the educational program:

No	Full name	Place of work, position
1	Valerii Polishchuk	The Ukrainian Scientific Centre for Development of Information Technology, Director
2	Viktor Shevchenko	Institute of Software Systems of the National Academy of Sciences of Ukraine, Deputy Director, Doctor of Technical Sciences, Professor
3	Volodymyr Fedorov	Fedorov Individual Entrepreneur, Director, PhD in Physics and Mathematics

1. Profile of the educational and professional program

1 – General information	
<i>Full name of the higher education institution and structural unit</i>	International European University Education and Research Institute “European Business School” Department of Information Technology
<i>Degree of higher education and qualification in the original language</i>	Bachelor of Software Engineering
<i>Official name of the educational program</i>	Software Engineering
<i>Type of diploma and capacity of the educational program</i>	Bachelor’s Degree Diploma, single, 240 ECTS credits, Period of study: 3 years and 10 months.
<i>Cycle/level</i>	NQF of Ukraine – 6 th level FQ-EHEA – first cycle EQF-LLL – 6 th level
<i>Background</i>	Complete general secondary education or a degree of Junior Bachelor, Professional Junior Bachelor (Junior Specialist). Based on the degree of Junior Bachelor (Junior Specialist), the higher education institution has the right to recognize and re-credit no more than 120 ECTS credits received as part of the previous educational program of Junior Bachelor (Junior Specialist) in specialties of the 12 Information Technology knowledge area and no more than 60 ECTS credits received as part of the previous educational program of Junior Bachelor (Junior Specialist) in other specialties; based on the degree of Professional Junior Bachelor, the higher education institution has the right to recognize and re-credit no more than 60 ECTS credits received as part of the previous educational program of professional pre-higher education. Admission based on the degrees of Junior Bachelor, Professional Junior Bachelor, or Junior Specialist is carried out according to the results of the external independent testing in the manner prescribed by law.
<i>Language(s) of instruction</i>	Ukrainian
<i>Validity of the educational program</i>	Until the next accreditation
<i>Internet address of constant placement of educational program description</i>	https://business.ieu.edu.ua/kafedry/kafedra-informatsiinykh-tekhnohii
2 – Goal of the educational program	
To train professionals based on the principles of creativity and academic integrity, who will be able to think critically, adopt innovations and integrate into the European community, who are proficient in programming, software development and software engineering methods to develop software, taking into account the requirements for its quality, reliability, production and user characteristics.	
3 – Characteristics of the educational program	
<i>Subject area (knowledge area,</i>	Knowledge area: 12 Information Technology Specialty: 121 Software Engineering

<p><i>specialty, specialization (if any))</i></p>	<p>The program is aimed at training software developers able to produce high-quality IT products for various activity areas, in particular, to design information systems in management.</p> <p>Learning objectives: to train specialists able to solve tasks and problems in the development, quality assurance, integration and maintenance of software tools based on state-of-the-art tools and industry-specific innovations.</p> <p>Theoretical content of the subject area: basic mathematical, technological, linguistic, resource and economic conceptual regulations on software development and maintenance engineering and software quality assurance.</p> <p>Methods, techniques and technologies: applied analysis and modeling methods, definition of information needs, data classification and analysis for software design; methods for developing software requirements; methods of software model analysis and construction; methods of software design, construction, integration, testing and verification; methods of software component modification; models and methods of software engineering reliability and quality; methods of software project management.</p> <p>Tools and equipment: software, hardware, instrumental, resource and documentation tools for software engineering processes.</p>
<p><i>Focus of the educational program</i></p>	<p>Educational and professional program.</p> <p>The program is based on generally known scientific and practical results of software engineering, taking into account its current state, and focused on relevant specializations for potential further professional and scientific career.</p> <p>The program has an applied focus on training specialists able to efficiently and reasonably solve problems of high-quality IT product software design and development, in particular, information systems in management.</p>
<p><i>Key focus of the educational program and specialization</i></p>	<p>Special education and professional training in IT product software engineering, information systems in management and decision making.</p> <p>Keywords: Requirements Analysis, Software Construction, Software Engineering, Software, Software Product, Software Design, Architectural Design, Top-Level Design, Software Requirements Specification, Software Testing, Software Quality, Project Management, Software Engineering Management, Information System.</p>
<p><i>Program features</i></p>	<p>The part of professional disciplines can be taught in English (bilingual education). The part of relevant professional topics can be taught by representatives of leading IT companies in the form of workshops or virtual internships.</p> <p>The program implies the integration of theoretical and practical training with the work of the general university center for informatization of University activities where students produce application software on request of University units.</p>
<p>4 – Graduates’ ability to employment and further study</p>	
<p><i>Employability</i></p>	<p>Specialists can hold the following primary positions (according to the National Classifier of Ukraine DK 003:2010):</p> <ul style="list-style-type: none"> 2131.2 – Database administrator 2132.2 – Software engineer 2132.2 – Programmer (database) 2132.2 – Application programmer

	3121.2 – Software development and testing specialist Positions of programmer and tester at IT companies, small and large enterprises, technological and information institutes (researcher, quality assurance, commerce, management).
<i>Further study</i>	A possibility to continue study at the second level of higher education (Master's program). Acquisition of additional qualifications in the postgraduate education system.
5 – Teaching and assessment	
<i>Teaching and learning</i>	Learning style: active, which allows students to choose the subject and organize their time. Lectures, laboratory works, seminars, practical classes in small groups, independent work based on textbooks and lecture notes, consultations with lecturers. The use of electronic means, such as the university e-learning platform. Within the past year, most of the time has been devoted to a thesis presented and defended before the board of scientists.
<i>Assessment</i>	The student progress is assessed according to the national scale and the 100-point ECTS scale.
6 – Program competencies	
<i>Integral competence</i>	Ability to solve complicated specialized tasks and practical problems in software engineering characterized by complexity and uncertainty of conditions using theories and methods of information technology.
<i>General competencies (GC)</i>	GC 1. Ability to abstract thinking, analysis and synthesis. GC 2. Ability to apply knowledge in practical situations. GC 3. Ability to talk in a state language both orally and in written form. GC 4. Ability to communicate in a foreign language both orally and in written form. GC 5. Ability to learn and acquire contemporary knowledge. GC 6. Ability to find, process and analyze information from different sources. GC 7. Ability to work in a team. GC 8. Ability to act based on ethical considerations. GC 9. Desire to preserve the environment. GC 10. Ability to act in a socially conscious manner. GC 11. Ability to exercise your rights and obligations as a member of society, realize values of civil (democratic) society and need for its steady growth, supremacy of law, rights and freedoms of individuals and citizens in Ukraine. GC 12. Ability to keep and multiply moral, cultural, scientific values and achievements of society based on the understanding of history and regularities of subject area development, its place in the general system of knowledge about nature and society and in the evolution of society, engineering and technologies, as well as to use different types and forms of physical activity for outdoor activities and a healthy lifestyle.
<i>Specialized (professional) competencies (SC)</i>	SC 1. Ability to identify, classify and formulate software requirements. SC 2. Ability to take part in software design, including modeling (formal description) of its structure, behavior and operational processes. SC 3. Ability to develop architectures, modules and components of software systems. SC 4. Ability to formulate and ensure software quality requirements in accordance with customer requirements, terms of reference and standards.

	<p>SC 5. Ability to comply with specifications, standards, rules and guidelines in the professional sector when implementing software life cycle processes.</p> <p>SC 6. Ability to analyze, select and apply methods and tools for information security (including cybersecurity).</p> <p>SC 7. To know data information models, ability to develop software to store, mine and process data.</p> <p>SC 8. Ability to apply fundamental and interdisciplinary knowledge to successfully solve software engineering problems.</p> <p>SC 9. Ability to assess and consider economic, social, technological and environmental factors affecting professional activities.</p> <p>SC 10. Ability to accumulate, process and systematize professional knowledge of software engineering and maintenance; to recognize the importance of lifelong learning.</p> <p>SC 11. Ability to implement phases and iterations of the life cycle of software systems and information technology based on appropriate software development models and approaches.</p> <p>SC 12. Ability to conduct the system integration process, apply change management standards and procedures to maintain software integrity, overall functionality and reliability.</p> <p>SC 13. Ability to reasonably select and learn software development and maintenance tools.</p> <p>SC 14. Ability to think algorithmically and logically.</p>
7 – Program learning outcomes (PLO)	
	<p>PLO 1. To analyze, intentionally search for and select information and reference resources and knowledge required to solve professional problems, taking into account current scientific and technological achievements.</p> <p>PLO 2. To know the code of professional ethics, understand the social significance and cultural aspects of software engineering, as well as observe them in professional activities.</p> <p>PLO 3. To know basic processes, phases and iterations of the software life cycle.</p> <p>PLO 4. To know and apply professional standards and other regulatory documents in the software engineering sector.</p> <p>PLO 5. To know and apply appropriate mathematical concepts, methods of domain, system and object-oriented analysis and mathematical modeling for software development.</p> <p>PLO 6. Ability to select and use the appropriate software development methodology.</p> <p>PLO 7. To know and apply the fundamental concepts, paradigms and key operational principles of language, instrumental and computational software engineering tools in practice.</p> <p>PLO 8. To be able to develop a human-machine interface.</p> <p>PLO 9. To know and be able to use methods and tools for collecting, formulating and analyzing software requirements.</p> <p>PLO 10. To conduct a pre-project examination of the subject area and the system analysis of the design object.</p> <p>PLO 11. To select design input data using formal methods of requirements description and modeling.</p> <p>PLO 12. To apply efficient software design approaches in practice.</p>

	<p>PLO 13. To know and apply methods of algorithm design, software design, as well as data and knowledge structures.</p> <p>PLO 14. To apply instrumental software tools for domain analysis, design, testing, visualization, measurement and documentation in practice.</p> <p>PLO 15. To be motivated in selecting programming languages and development technologies to solve problems of creating and maintaining software.</p> <p>PLO 16. To have skills of team development, coordination, design and release of all types of software documents.</p> <p>PLO 17. To be able to apply component-based software development techniques.</p> <p>PLO 18. To know and be able to use information technology to process, store and transmit data.</p> <p>PLO 19. To know and be able to apply software verification and validation methods.</p> <p>PLO 20. To know approaches to software quality assessment and assurance.</p> <p>PLO 21. To know, analyze, select and skillfully apply information security (including cybersecurity) and data integrity tools according to the application tasks and software systems to be created.</p> <p>PLO 22. To know and be able to apply project management techniques and tools.</p> <p>PLO 23. To be able to document and present the results of software development.</p> <p>PLO 24. To be able to calculate the economic efficiency of software systems.</p>
8 – Resource support for program implementation	
Staffing	<p>Guarantor: Oleksandr Nesterenko, Doctor of Technical Sciences, Professor.</p> <p>The qualification of the academic staff engaged in the educational and professional program corresponds to the profile and area of the taught discipline. They have appropriate professional achievements. Professionals with research and/or professional experience, as well as English-speaking lecturers, are involved in the organization of the educational process.</p>
Material and technical support	<p>The material and technical support of the Department of Information Technology at the Education and Research Institute “European Business School” has a sufficient classroom fund. Professional laboratory and practical works are performed in specialized classrooms of the Department of Information Technology: 1 computer lab per 15 workplaces fitted with two displays, server room, classroom for self-study of students. All rooms have Wi-Fi points.</p>
Information and educational and methodical support	<p>The University’s virtual training environment (based on Dspace and Moodle software) includes digitized library collections of the educational electronic library and author’s distance learning courses developed by lecturers of the Department of Information Technology. Besides, one applies cloud technology elements from Google Cloud resources and Google Classroom technologies.</p> <p>Official website of the Department of Information Technology containing key information about the educational program and educational and methodical support.</p>

9 – Academic mobility	
National credit mobility	Based on bilateral cooperation agreements between IEU and Ukrainian higher education institutions.
International credit mobility	Based on bilateral cooperation agreements with the world's leading IT companies and universities.
Training of foreign students	Training of foreign students is provided in case of undertaking additional language training.

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

2.1. List of EP components

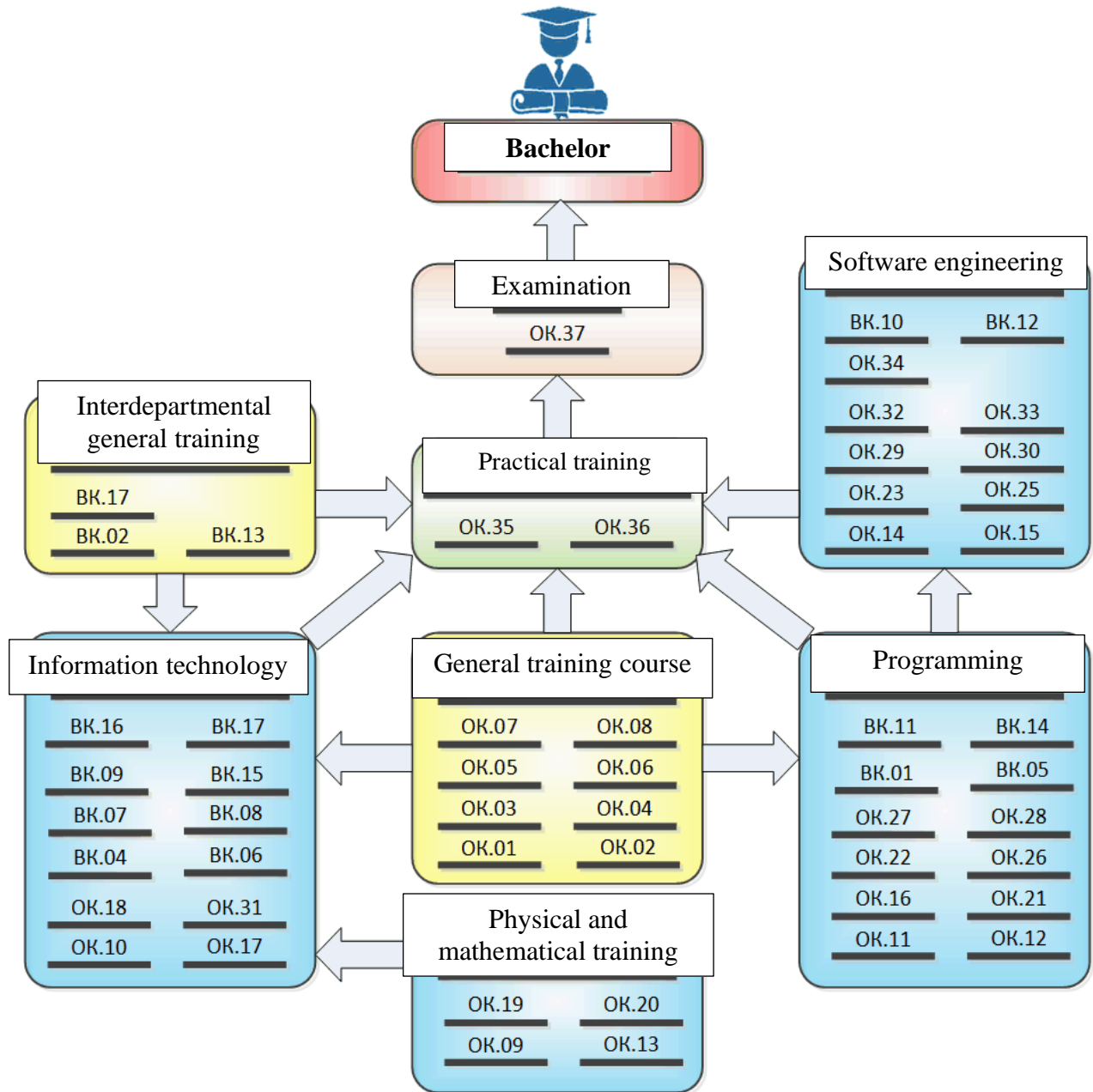
Discipline code	Components of the educational program (academic disciplines, term papers, practical training, qualifying paper)	Number of credits	Form of final control
1	2	3	4
1. Obligatory components			
<i>General training course</i>			
OC1	History of Ukrainian Statehood and Culture	4	exam
OC2	Academic Integrity and Basics of Scientific Research	4	exam
OC3	Ukrainian (Professional)	4	exam
OC4	Health and Safety, Labor Protection and Civil Defense	3	Pass/Fail test
OC5	Foreign Language (Professional)	21	Pass/Fail test, exam
OC6	Philosophy, Ethics and Aesthetics	3	Pass/Fail test
OC7	Law	4	Pass/Fail test
OC8	Digital Technologies for Learning and Professional Activities	4	exam
<i>Professional training course</i>			
OC9	Higher and Applied Mathematics	8	Pass/Fail test, exam
OC10	Methods and Tools of Computer Information Technology	4	Pass/Fail test
OC11	Fundamentals of Programming	8	Pass/Fail test, exam
OC12	Data Algorithms and Structures	4	exam
OC13	Computer-Based Discrete Mathematics	4	exam
OC14	Fundamentals of Software Engineering	4	Pass/Fail test
OC15	Group Dynamics and Communications	3	Pass/Fail test
OC16	Object-Oriented Programming	8	Pass/Fail test, exam
OC17	Organization of Databases and Knowledge Bases	8	Pass/Fail test, exam, term paper
OC18	Computer Networking Organization	4	exam
OC19	Probability Theory and Mathematical Statistics	4	exam
OC20	Physics (Selected Sections)	4	exam
OC21	Human-Machine Interaction	4	Pass/Fail test
OC22	Operating Systems	4	exam
OC23	Analysis of Software Requirements	5	exam
OC24	Computer Architecture	3	exam
OC25	Software Architecture and Design	5	exam
OC26	Web Application Programming	3	Pass/Fail test
OC27	Software Quality and Testing	4	Pass/Fail test
OC28	Software Construction	4	exam
OC29	Software Project Management	3	exam

OC30	Software Modeling and Analysis	5	exam, term paper
OC31	Software and Data Security	5	exam
OC32	Professional Practice of Software Engineering	4	exam
OC33	Software Product Economics	3	exam
OC34	Empirical Software Engineering Methods	4	exam
<i>Practical training</i>			
OC35	On-the-Job Training	4	Pass/Fail test
OC36	Pre-Graduation Practical Training	4	Pass/Fail test
Student examination			
OC37	Qualifying paper	6	defense
Total number of obligatory components:		180	
Total number of elective components:		60	
TOTAL CAPACITY OF THE EDUCATIONAL PROGRAM		240	

2.2. Structural and logical scheme of the allocation of educational components by semesters

	General training course	Professional training course	Practical training	Examination
8 th semester		BK.17 BK.16 BK.15 BK.14 BK.13 OK.34 OK.33		OK.37
7 th semester	OK.5	BK.12 BK.11 BK.10 BK.09 OK.32 OK.31	OK.36	
6 th semester	OK.5	BK.08 BK.07 BK.06 OK.30 OK.29 OK.28	OK.35	
5 th semester	OK.5	BK.05 BK.04 OK.27 OK.26 OK.25 OK.24 OK.23		
4 th semester	OK.5	BK.03 BK.02 BK.01 OK.22 OK.21 OK.17 OK.16		
3 rd semester	OK.5	OK.12 OK.20 OK.19 OK.18 OK.17 OK.16 OK.15		
2 nd semester	OK.7 OK.6 OK.5	OK.14 OK.13 OK.11 OK.10 OK.09		
1 st semester	OK.8 OK.5 OK.4 OK.3 OK.2 OK.1	OK.11 OK.09		

2.2. Structural and logical scheme of the educational program



3. Form of student examination

Forms of student examination	The examination of graduates of the Software Engineering educational and professional program in 121 Software Engineering specialty is conducted in the form of public defense of the qualifying paper.
Qualifying paper requirements (if any)	<p>A qualifying paper should solve a specialized task or practical application problem in software engineering characterized by complexity of conditions using theories and methods of information technology.</p> <p>The qualifying paper should not contain academic plagiarism, falsification and copying.</p> <p>The qualifying paper should be published on the official website of International European University or on the website of the European Business School.</p> <p>The publication of qualifying papers containing restricted access information should be carried out in accordance with the current legislation.</p>

4. Requirements for the system of internal higher education quality assurance

International European University has the system of internal higher education quality assurance (internal quality assurance system) that includes the following procedures and measures:

- definition of principles and procedures of higher education quality assurance;
- monitoring and periodical review of educational programs;
- annual assessment of students, academic and teaching staff of the University and regular announcement of the assessment results on the official website of the University, information stands or in any other way;
- advanced training of the teaching, scientific and academic staff;
- availability of resources required to organize the educational process, including independent work of students in each educational program;
- availability of information systems for efficient management of the educational process;
- publicity of information about educational programs, higher education degrees and qualifications;
- compliance with academic integrity among the University personnel and students, including creation and functioning of the efficient system for preventing and detecting academic plagiarism;
- other procedures and measures.

The system of internal higher education quality assurance (internal quality assurance system) is assessed as requested by the University by the National Agency for Higher Education Quality Assurance (NAQA) or independent institutions of higher education quality assessment and assurance accredited by NAQA for its compliance with the requirements of the higher education quality assurance system approved by NAQA, international standards and recommendations for higher education quality assurance.

Educational components of the program	Program competencies																									
	GC 01	GC 02	GC 03	GC 04	GC 05	GC 06	GC 07	GC 08	GC 09	GC 10	GC 11	GC 12	SC 01	SC 02	SC 03	SC 04	SC 05	SC 06	SC 07	SC 08	SC 09	SC 10	SC 11	SC 12	SC 13	SC 14
OC21	*													*										*		*
OC22	*													*				*						*	*	
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OC36		*			*	*	*		*				*	*	*		*				*	*	*	*	*	*
OC37		*	*			*								*	*		*	*			*	*	*			*

Components of the educational program (discipline), practical training, individual tasks	Program learning outcomes																								
	PLO 01	PLO 02	PLO 03	PLO 04	PLO 05	PLO 06	PLO 07	PLO 08	PLO 09	PLO 10	PLO 11	PLO 12	PLO 13	PLO 14	PLO 15	PLO 16	PLO 17	PLO 18	PLO 19	PLO 20	PLO 21	PLO 22	PLO 23	PLO 24	
OC17	*						*			*			*					*							
OC18							*								*			*				*			
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OC36	*	*	*	*		*	*		*	*	*	*	*	*	*	*							*	*	
OC37	*	*		*	*	*					*	*	*	*	*					*					*