3. Educational Programme

Project Team Leader (Educational Programme Director) – Bulba S.A., PhD in Economics, Senior Lecturer of the Department of Software Engineering and Cybersecurity.

3.1. Profile of the Educational Programme 'Software Engineering' in the Subject Area F2 'Software Engineering'

1- GENERAL INFORMATION	
Full name of a HEI and a structural unit	State University of Trade and Economics Faculty of Finance and Banking Department of Software Engineering and Cyber Security
Higher Education Level and title of qualification in the original language	First (Bachelor's) cycle of higher education Qualification – Bachelor's degree in Software Engineering
Field of Knowledge	F Information technologies
Subject Area	F2 Software engineering
Educational Programme Official Name	«Software Engineering"
Restrictions on Modes of Study	There are no restrictions.
Compliance with the Higher Education Standard of the Ministry of Education and Culture of Ukraine	Complies with the Higher Education Standard of the Ministry of Education and Science of Ukraine (Order No. 1166 dated 29.10.2018)
Diploma Type and the Educational Programme Volume	Bachelor's Degree Diploma, single, 240 ECTS credits, training period: 3 years and 10 months.
Accreditation Availability	Certificate of accreditation of the speciality No. 7649, valid until 01.07.2029, issued by the National Agency for Quality Assurance in Higher Education
Higher Education Cycle/Level	NQF of Ukraine – Level 6, FQ-EHEA – First cycle, EQF-LLL – Level 6.
Prerequisites for Admission to the Educational Programme	Complete general secondary education, initial level of higher education
Language(s) of Training	Ukrainian
Term of validity of the educational programme	Until the approval of the new edition of the educational programme
Internet Address for Permanent Placement of the Educational Programme Description	https://knute.edu.ua/

2 – THE PURPOSE OF THE EDUCATIONAL PROGRAMME

Formation of a personality capable of being acquired based on integrated, general and professional competences, the ability to work successfully in the field of IT, through the application of scientific and mathematical principles to perform design, analysis, verification, validation, implementation and maintenance of computer software using different programming languages.

3 –EDUCATIONAL PROGRAMME CHARACTERISTICS

Subject area

Object of study and activity: software, processes, tools and resources for the development, maintenance and quality assurance of software.

Learning objectives: training of specialists capable of setting and solving tasks related to the development, maintenance and quality assurance of software.

Theoretical content of the subject area: basic mathematical, informational, physical, and economic provisions regarding the creation and support of software; basics of domain analysis, modelling, design, construction, and software support.

Methods, techniques, and technologies: software development methods and technologies; collection, processing and interpretation of software engineering research results.

Tools and equipment: software, hardware and tools for software development, support and operation.

Educational Programme Orientation

Educational and Professional

Main Focus of the Educational Programme

Special education in the field of study "Software Engineering" in the subject area Software Engineering. The orientation of the programme is based on well-known scientific results, taking into account the current state of IT and programming. Focuses on current specialisations, within which further professional and scientific careers are possible: software engineer, system programmer, IT technology specialist, computer graphics (design) specialist, software development and testing specialist.

Keywords: programming, programming languages, technical task, design, development, software testing, software design, software engineering, operating systems.

Educational Programme Features

The peculiarity of the program is to fill it with educational components that, in their logical sequence and content, provide an in-depth study of the full cycle of software development and provide knowledge of promising areas of IT development in the context of the needs of the trade and economic sector.

The uniqueness of the program is a thorough technical training combined with knowledge in the field of economics and business, which allows applicants for educational services to gain broad prospects and form their own professional competitiveness in the labour market within one of the most relevant professions in the world.

4 – EMPLOYABILITY AND FURTHER EDUCATION OPPORTUNITIES

FOR GRADUATES
Employability
Employment at enterprises of various forms of ownership, in state and local governments, public organisations. Specialists can hold primary positions (according to the National Classification of Ukraine: “Classifier of professions” DK 003: 2010: 2132.2 Software engineer 2132.2 Programmer (database) 2132.2 Application programmer 2132.2 System programmer 3121 Programming technician 3121 Information technology specialist 3121 Computer graphics (design) specialist 3121 Software development and testing specialist 3121 Computer program development specialist
Further Education Opportunities
Obtaining a degree at the second (master's) cycle of higher education. Acquiring additional qualifications in the postgraduate education system.
5-TEACHING AND ASSESSMENT
Teaching and Learning
A balanced combination of classroom instruction (lectures, discussions, seminars, small group workshops, independent work with information sources, and teacher consultations), distance learning, and independent work based on problem-based, interactive, and self-study.
Assessment
The assessment of students' learning outcomes is carried out by the ‘Regulations on the assessment of students' and postgraduate students' learning outcomes at SUTE and involves the following control measures: ongoing and final assessments, and attestation. Ongoing assessment is carried out during practical/laboratory classes and based on the results of individual assignments. It involves assessing students' theoretical knowledge during seminars and the practical skills they have acquired while performing laboratory/practical tasks. Final assessment consists of control measures that determine the compliance (measurement, evaluation) of the learning outcomes achieved by a person with the requirements of the educational programme in terms of the relevant educational component, which is carried out at the university in the form of a credit and an exam. The learning outcomes of students at SUTE are assessed on a 100-point scale, where: 60-100 points – learning outcomes that entitle the student to obtain ECTS credits; 0-59 points – unsatisfactory learning outcomes that do not entitle the student to obtain ECTS credits.

6-PROGRAMME COMPETENCIES	
Integral competence	
Ability to solve complex specialised tasks or practical problems of software engineering, characterised by complexity and uncertainty of conditions, using theories and methods of information technology.	
General competencies (GC)	
GC01	Ability to think abstractly, analyse and synthesise.

GC2	Ability to apply knowledge in practical situations.
GC03	Ability to communicate in the state language both orally and in writing.
GC04	Ability to communicate in a foreign language both orally and in writing.
GC05	Ability to learn and master modern knowledge.
GC06	Ability to search, process and analyse information from various sources.
GC07	Ability to work in a team.
GC08	Ability to act on the basis of ethical considerations.
GC09	The desire to preserve the environment.
GC10	Ability to act in a socially responsible and conscious manner.
GC11	Ability to exercise their rights and responsibilities as a member of society, to realise 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.
GC12	Ability to preserve and enhance moral, cultural, scientific values and achievements of society based on an understanding of 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, technology and technology, to use various types and forms of physical activity for active recreation and a healthy lifestyle.
GC12[I]	Ability to make decisions and act in compliance with the principle of inadmissibility of corruption and any other manifestations of dishonesty.
Special (professional, subject-specific) competencies (SC)	
SC1	Ability to identify, classify and formulate software requirements.
SC2	Ability to participate in the design of software, including modelling (formal description) of its structure, behaviour and processes of functioning.
SC3	Ability to develop architectures, modules and components of software systems.
SC4	Ability to formulate and ensure software quality requirements in accordance with customer requirements, terms of reference, and standards.
SC5	Ability to comply with specifications, standards, rules and guidelines in the professional field when implementing life cycle processes.
SC6	Ability to analyse, select and apply methods and tools to ensure information security (including cybersecurity).
SC7	Knowledge of data information models, ability to create software for data storage, extraction and processing.
SC8	Ability to apply fundamental and interdisciplinary knowledge to successfully solve software engineering problems.
SC9	Ability to evaluate and take into account economic, social, technological and environmental factors that affect the field of professional activity.
SC10	Ability to accumulate, process and systematise professional knowledge of software development and maintenance and recognise the importance of lifelong learning.
SC11	Ability to implement phases and iterations of the life cycle of software systems and information technologies based on appropriate software development models and approaches.
SC12	Ability to carry out the process of system integration, apply change

	management standards and procedures to maintain the integrity, overall functionality and reliability of the software.
SC13	Ability to reasonably select and master tools for software development and maintenance.
SC14	Ability to think algorithmically and logically.
7-PROGRAMME LEARNING OUTCOMES	
PLO01	To analyse, purposefully search for and select information and reference resources and knowledge necessary for solving professional problems, taking into account modern advances in science and technology.
PLO02	To know the code of professional ethics, understand the social significance and cultural aspects of software engineering and adhere to them in professional activities.
PLO03	To know the basic processes, phases and iterations of the software life cycle.
PLO04	To know and apply professional standards and other regulatory documents in the field of software engineering.
PLO05	To know and apply relevant mathematical concepts, methods of domain, system and object-oriented analysis and mathematical modelling for software development.
PLO06	To be able to choose and use the appropriate software development methodology for the task.
PLO07	To know and apply in practice the fundamental concepts, paradigms and basic principles of functioning of language, tools and computing tools of software engineering.
PLO08	To be able to develop a human-machine interface.
PLO09	To know and be able to use methods and tools for collecting, formulating and analysing software requirements.
PLO10	To conduct a pre-project survey of the subject area, system analysis of the design object.
PLO11	To select input data for design, guided by formal methods of requirements description and modelling.
PLO12	To apply effective software design approaches in practice.
PLO13	To know and apply methods of algorithm development, software design, and data and knowledge structures.
PLO14	To apply in practice software tools for domain analysis, design, testing, visualisation, measurement, and documentation of software.
PLO15	To be motivated to choose programming languages and development technologies to solve the problems of creating and maintaining software.
PLO16	To have the skills of team development, approval, design and release of all types of program documentation.
PLO17	To be able to apply methods of component-based software development.
PLO18	To know and be able to apply information technologies for data processing, storage and transmission.
PLO19	To know and be able to apply methods of software verification and validation.
PLO20	To know approaches to assessing and ensuring software quality.

PLO21	To know, analyse, select, and competently apply means of ensuring information security (including cybersecurity) and data integrity in accordance with the applied tasks and software systems being developed.
PLO22	To know and be able to apply project management methods and tools.
PLO23	To be able to document and present the results of software development.
PLO24	To be able to calculate the economic efficiency of software systems.
PLO25	To understand and exercise their rights and responsibilities as a member of society, to realise the values of a free democratic society, the rule of law, human and civil rights and freedoms in Ukraine.
PLO26	To act based on the legislative and regulatory framework of Ukraine and the requirements of relevant standards, including international standards in the field of information and/or cybersecurity.

8- RESOURCE SUPPORT FOR PROGRAMME IMPLEMENTATION

Staffing

Fully complies with the licensing requirements for educational activities. The educational and professional programme "Software engineering" is implemented by academic staff with scientific degrees and/or academic titles who meet the requirements of the current legislation of Ukraine and have a sufficient level of scientific and professional qualifications. Practitioners, representatives of professional associations and foreign partners are also involved in the educational process.

All academic staff undergo training/professional development every five years.

Material and technical support

Fully complies with the Licensing Requirements for Educational Activities. For the convenience of higher education students, there is a corporate distance learning system and an automated educational process management system called 'MIA: Education'. The university has modern computer classrooms with specialised software and a Smart Library. All conditions for the education of persons with disabilities have been created. SUTE social infrastructure is available.

Information and educational-methodological support

An ECTS Information Package is developed for each educational programme at the university. Each student can view and create his/her individual plan, view the curriculum, grades obtained in disciplines, class schedule, and communicate with participants in the educational process through a personal account in the MIA: Education automated information system.

Course summaries, course outlines, syllabi and assessment criteria for educational components are posted on the corporate distance learning platform.

The university's electronic repository provides full-text access to SUTE scientific and educational literature, manuscripts of qualification works and theses for obtaining academic degrees.

For the convenience of higher education students, the university has developed a Catalogue of Academic Disciplines, according to which students have the right to choose elective educational components.

9-ACADEMIC MOBILITY

National credit mobility

National credit mobility is implemented within the framework of memoranda of cooperation concluded between SUTE and other higher education institutions (research institutions) in Ukraine under the law.
International credit mobility
The University has concluded cooperation agreements between SUTE and foreign higher education institutions, which provide for partner exchange and training of students under international programs and projects within the framework of the Erasmus+ program. The University has concluded cooperation agreements with foreign higher education institutions, within the framework of which partner exchange and student training under international programs and projects within the framework of the Erasmus+ program are carried out. Organisation of credit mobility (except for the 1st year) for bachelors. Mobility agreement between SUTE and the Slovak University of Technology (Bratislava): Erasmus+ Learning Agreement Student Mobility for Studies International Mobility (KA171). The academic mobility agreement is valid from 2024 to 2027.
Foreign Higher Education Students Training
It is carried out under the requirements of current legislation.

2. LIST OF COMPONENTS OF THE EDUCATIONAL PROGRAMME AND THEIR LOGICAL SEQUENCE

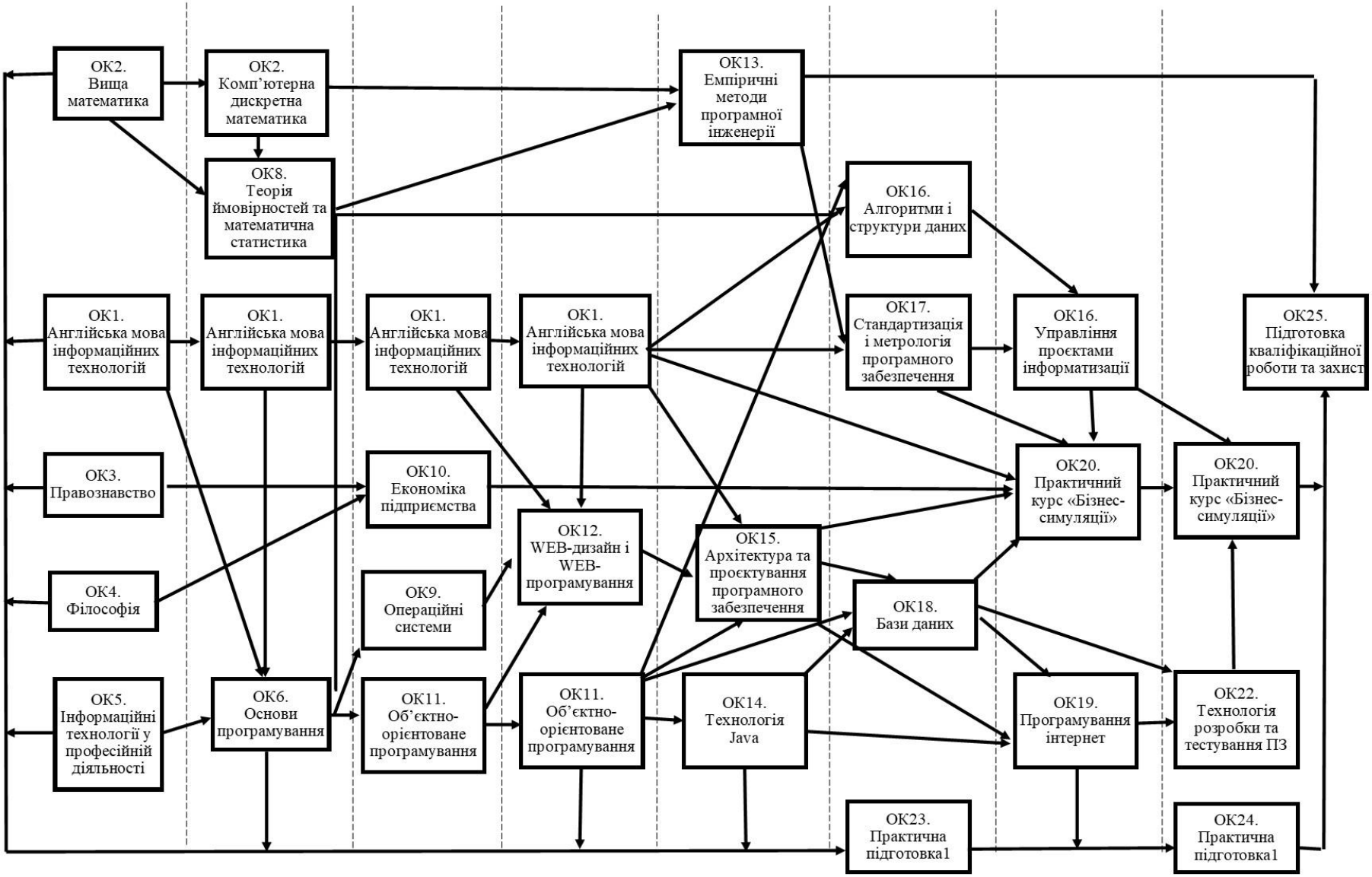
2.1.List of EP components

Code	Educational programme components	ECTS credits	Form of control
EP Compulsory components			
CC 1.	English of Information Technologies	24	Exam
CC 2.	Higher Mathematics	6	Exam
CC 3.	Jurisprudence	6	Exam
CC 4.	Philosophy	6	Exam
CC 5.	Information Technologies in Professional Activity	6	Exam
CC 6.	Fundamentals of Programming	6	Exam
CC 7.	Computer Discrete Mathematics	6	Exam
CC 8.	Probability Theory and Mathematical Statistics	6	Exam
CC 9.	Operating Systems	6	Exam
CC 10.	Business Economics	6	Exam
CC 11.	Object-oriented Programming	12	Exam
CC 12.	Web Design and Web Programming	6	Exam
CC13	Empirical Methods of Software Engineering	6	Exam
CC 14.	Java Technology	6	Exam
CC 15.	Software Architecture and Design	6	Exam
CC 16.	Algorithms and data Structures	6	Exam
CC17	Software Standardisation and Metrology	6	Exam
CC 18.	Databases	6	Exam
CC 19.	Internet Programming	6	Exam
CC 20.	Practical Course "Business Simulation"	9	Exam
CC 21.	Informatisation Project Management	6	Exam
CC 22.	Software Development and Testing Technology	6	Exam
CC 23.	Internship 1	6	Credit
CC 24.	Internship 1	6	Credit
CC25.	Preparation for the Attestation Exam and Attestation	9	Defence
Total Volume of Compulsory Components		**180**	
EP Elective Components			
EC1	Educational Component 1	6	Exam
EC2	Educational Component 2	6	Exam
EC3	Educational Component 3	6	Exam
EC4	Educational Component 4	6	Exam
EC5	Educational Component 5	6	Exam
EC6	Educational Component 6	6	Exam
EC7	Educational Component 7	6	Exam
EC8	Educational Component 8	6	Exam
EC9	Educational Component 9	6	Exam

EC10	Educational Component 10	6	Exam
Total Volume of Elective Components		**60**	
THE EDUCATIONAL PROGRAMME TOTAL VOLUME		**240**	

Higher education students choose their elective disciplines through the personal account of the portal "MIA: Education". Descriptions of the disciplines and their prerequisites are available in the SUTE Catalogue of Disciplines.

2.2 Structural and logical scheme of EP



3.3. FORMS OF ATTESTATION OF HIGHER EDUCATION STUDENTS

The attestation is carried out in the form of a public defence of a qualification work.

The qualification work involves solving a specialised task or practical problem of software engineering, characterised by complexity and uncertainty of conditions, using theories and methods of information technology. The qualification paper may not contain academic plagiarism, falsification, or cheating. The qualification work must be published on the official website of the higher education institution or its subdivision, or in the repository of the higher education institution. The publication of qualification papers containing information with restricted access shall be carried out in accordance with the requirements of the current legislation.

3.4. MATRIX OF CORRESPONDENCE BETWEEN PROGRAM COMPETENCIES AND COMPULSORY COMPONENTS OF THE EDUCATIONAL PROGRAMME

	Components/ Competencies	CC 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC10	CC 11	CC 12	CC 13	**CC 14**	**CC 15**	**CC 16**	**CC 17**	**CC18**	**CC 19**	**CC 20**	**CC 21**	**CC 22**	**CC23.**	**CC24.**	**CC25.**
General competencies	GC01	+	+		+			+	+	+			+	+	+		+						+	+	+	+
	GC02						+		+		+			+		+		+	+	+			+	+	+	+
	GC03		+	+	+		+	+				+	+		+			+					+	+	+	+
	GC04	+										+														
	GC05		+		+			+	+	+	+		+	+	+		+			+			+	+	+	+
	GC06		+		+	+		+			+		+	+	+			+	+				+	+	+	+
	GC07										+	+				+						+		+	+	+
	GC08	+	+	+																						
	GC09			+	+																					
	GC10			+	+																			+	+	+
	GC11			+	+																					
	GC12			+	+																			+	+	+
	GC12/			+															+		+			+	+	+
Special (general, subject) competencies	SC1										+	+				+		+		+		+	+	+	+	+
	SC2										+	+			+	+			+			+		+	+	+
	SC3						+		+						+	+								+	+	+
	SC4															+		+		+				+	+	+
	SC5															+		+		+				+	+	+
	SC6								+							+		+	+					+	+	+
	SC7																+		+					+	+	+
	SC8	+	+	+	+			+		+			+						+		+			+	+	+
	SC9			+	+					+											+			+	+	+
	SC10					+					+	+			+		+	+		+				+	+	+
	SC11													+				+				+		+	+	+
	SC12																	+	+			+		+	+	+
	SC13											+										+	+	+	+	+
	SC14					+	+		+		+				+		+			+				+	+	+

3.5 MATRIX OF CORRELATION BETWEEN PROGRAM LEARNING OUTCOMES AND COMPULSORY COMPONENTS OF THE EDUCATIONAL PROGRAMME

Components /Program learning outcomes	CC1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC11	CC 12	CC 13	CC 14	CC 15	CC 16	CC 17	CC 18	CC 19	CC 20	CC 21	**OK 22**	**OK 23**	**OK 24**	**OK 25**
PLO01	+					+				+					+	+							+	+	+
PLO02	+		+	+						+													+	+	+
PLO03					+					+	+			+	+		+						+	+	+
PLO04					+												+		+		+		+	+	+
PLO05		+					+			+		+	+										+	+	+
PLO06															+	+							+	+	+
PLO07					+			+		+				+					+				+	+	+
PLO08								+			+												+	+	+
PLO09															+	+						+	+	+	+
PLO10															+							+	+	+	+
PLO11															+	+						+	+	+	+
PLO12						+				+					+								+	+	+
PLO13						+				+						+		+					+	+	+
PLO14								+							+		+					+	+	+	+
PLO15					+					+	+			+					+		+		+	+	+
PLO16					+					+				+	+		+		+		+	+	+	+	+
PLO17										+					+							+	+	+	+
PLO18																+		+					+	+	+
PLO19										+												+	+	+	+
PLO20					+												+						+	+	+
PLO21																	+	+	+		+		+	+	+
PLO22																	+				+		+	+	+
PLO23											+				+			+			+	+	+	+	+
PLO24									+			+					+		+	+	+		+	+	+
PLO25			+	+																			+	+	+
PLO26			+														+	+					+	+	+

Appendix

LIST OF RECOMMENDED ELECTIVE COMPONENTS

Code	Educational Components	ECTS Credits
EC 01.	Computer Architecture	**6**
EC 02.	Life Safety	**6**
EC 03.	Security of Information Systems and Networks	**6**
EC 04.	Expert Systems	**6**
EC 05.	Electronic Document Management	**6**
EC 06.	Human-Machine Interaction	**6**
EC 07.	Mathematical Programming	**6**
EC 08.	Software Project Management	**6**
EC 09.	Methods and Means of Data Transmission	**6**
EC 10.	Software Modelling and Analysis	**6**
EC 11.	Organisation of Computer Networks	**6**
EC 12.	Fundamentals of Cybersecurity	**6**
EC 13.	Technologies of Mobile Development	**6**
EC 14.	Technology for Creating a Startup	**6**
EC 15.	Communication English Tailored Course	**6**