

**Ministry of Science and Education of Ukraine**  
**Kyiv National University of Trade and Economics**

**EDUCATIONAL PROFESSIONAL PROGRAM**  
**"Software Engineering"**  
**the second level of higher education**  
**majoring in Software Engineering 121**  
**field of knowledge 12 Information technology**  
**Qualification: Master's Degree**  
**specialty "Software Engineering"**  
**specialization "Software Engineering"**

**APPROVED BY THE SCIENTIFIC COUNCIL of**  
**KNUTE**

**Chairman of the Scientific Council**

\_\_\_\_\_/A. A. Мазаракі/  
(protocol №\_\_ from \_\_\_\_ 2019 )

**The educational program is being put in place from \_\_\_\_ 2019 p.**

**Rector**\_\_\_\_\_/A. A. Мазаракі/  
(order №\_\_ from \_\_\_\_ 2019 p.)

**Kyiv 2019**

LETTER OF AGREEMENT  
on educational and professional program

Agreed  
First Vice-Rector  
on scientific and pedagogical work

\_\_\_\_\_ Н. В. Притульська  
\_\_\_\_\_ 2019 р.

Agreed  
Pro-rector  
on scientific and pedagogical work

\_\_\_\_\_ С. Л. Шаповал  
\_\_\_\_\_ 2019 р.

Agreed  
Head of KNUTE Studies Department

\_\_\_\_\_ К. В. Мостика  
\_\_\_\_\_ 2019 р.

Agreed  
Head of the Studies and methodical department of  
KNUTE

\_\_\_\_\_ Т. В. Божко  
\_\_\_\_\_ 2019 р.

Agreed  
Head of the Department of Software  
Engineering and Cyber  
Security \_\_\_\_\_ О. В.  
Криворучко  
\_\_\_\_\_ 2019 р.

Agreed  
Representative of the Student  
Government Board  
\_\_\_\_\_ М. Є. Антонович  
\_\_\_\_\_ 2019 р.

Agreed  
Deputy Director of the Certification  
Training Center of PROCOM LLC  
\_\_\_\_\_ І. А. Столярчук  
\_\_\_\_\_ 2019 р.

Agreed  
Head of development department of BGS  
LLC Consulting  
\_\_\_\_\_ П. О. Конопляник  
\_\_\_\_\_ 2019 р.

## PREFACE

Developed by a working group consisting of:

1. Пашорін В. І. – к.т.н., професор кафедри програмної інженерії та кібербезпеки КНТЕУ, керівник освітньої програми;
2. Криворучко Олена Володимирівна – д.т.н., професор, завідувач кафедри програмної інженерії та кібербезпеки;
3. Рзаєва Світлана Леонідівна – доцент кафедри програмної інженерії та кібербезпеки, к.т.н., доц.;
4. Цюцюра Світлана Володимирівна – професор кафедри програмної інженерії та кібербезпеки (завідувач кафедри інформаційних технологій, Київського національного університету будівництва і архітектури);
5. Харченко Олександр Анатолійович – декан факультету обліку, аудиту і інформаційних систем, к.т.н, доц.;
6. Роскладка Андрій Анатолійович – завідувач кафедри кібернетики та системного аналізу, д.е.н., проф.;
7. Корольчук Микола Степанович – завідувач кафедри психології, д.психол.н., проф.;
8. Чубаєвський Віталій Іванович – заступник директора Департаменту кіберполіції Національної поліції України, к.політ.н.;
9. Столярчук Ірина Аркадіївна – заступник директора Центра Сертифікаційного навчання ТОВ «ПРОКОМ», к.ф-м.н.;
10. Степашкіна Катерина Володимирівна – спеціаліст кафедри програмної інженерії та кібербезпеки;
11. Назаренко Дмитро Миколайович – студент факультету обліку, аудиту і інформаційних систем, 1 курсу, 5м групи, спеціальність «Інженерія програмного забезпечення»;
12. Івлєв Ігор Олександрович – студент факультету обліку, аудиту і інформаційних систем, 1 курсу, 5м групи, спеціальність «Інженерія програмного забезпечення».

External stakeholder' reviews :

1. Конопляник Павло Олександрович – «Бі Джі Ес» м. Київ.
2. Столярчук Ірина Аркадіївна – заступник директора Центра Сертифікаційного навчання ТОВ «ПРОКОМ» м. Київ.

**1. Profile of the educational program  
from the specialty 121 "Software Engineering"  
(specialization "Software Engineering")**

<b>1 – - General information</b>	
Full name of the higher educational establishment and structural unit	Kyiv National University of Trade and Economics Faculty of Accounting, Auditing and Information Systems and Psychology Department of Software Engineering and Cyber security
Degree of higher education and the name of the qualification in the language of the original	degree of higher education "master" specialty «Software Engineering"specialization «Software Engineering"
The official name of the educational program	«Software Engineering"
Type of diploma and volume of educational program	Masters degree, unitary, 90 ECTS credits, term of training – 1 year 4 months
Presence of accreditation	–
<b>Cycle / Level</b>	NRC Ukraine - 8 level, FQ-EHEA - second cycle, EQF-LLL - 7 level
<b>Prerequisites</b>	- Scientific degree - Bachelor
<b>Language (s) Teaching</b>	Ukrainian
<b>Validity of the educational program</b>	Until next scheduled update
Internet address of the permanent placement of the description of the educational program	<a href="https://knute.edu.ua">https://knute.edu.ua</a>
<b>2 – The purpose of the educational program</b>	
Formation of the personality of a specialist, capable to solve complex non-standard tasks and problems of research and innovative character in the field of software engineering	
<b>3 – Characteristics of the educational program</b>	
<b>Subject area (branch of knowledge, specialty, specialization) (in the presence)</b>	Branch of knowledge 12 «Information technologies» Specialty 121 «Software Engineering" Specialization «Software Engineering" training cycle – obligatory components 28,3%: general training cycle – 7,5%; the cycle of professional training – 8,3%; optional components 48,3%: general training cycle – 20%; the cycle of professional training – 28,3%; the cycle of professional training and attestation – 23,4%.
<b>Orientation of educational program</b>	The program focuses on educational, vocational and applied training

<b>The main focus of the educational program and specialization</b>	Educational and professional. Emphasis on the ability of a specialist to carry out research and innovation in the real world of industrial software production Keywords: functional programming, logical programming, biometric authentication technologies; GRID technologies; design of multimedia systems; security of telecommunication networks.
<b>Features of the program</b>	Integration of professional training in the field of software engineering with innovative activities, orientation to the implementation of real software projects
<b>4 - Eligibility of graduates for employment and further training</b>	
<b>Eligibility for employment</b>	Professional Economic Activities (DK 009: 2010) J.62 "Computer programming, consultancy and related activities". A wide range of software development specialist positions: software engineer, programmer (database), application programmer, computer software engineer, junior research fellow (programming), research associate (programming), research associate consultant (programming) etc.
<b>Further education</b>	Studying for the programs: the third educational (educational-scientific) level, the first scientific degree
<b>5 – Teaching and evaluation</b>	
<b>Teaching and learning</b>	Focused on students teaching, self-studying, laboratory-based learning, problem-based, interactive, project-based, information-computer, self-development, collective and integrative, contextual learning technologies
<b>Assessment</b>	Types of control: - by levels: self-control, control at the level of the lecturer, control at the level of the head of the department, control at the level of the dean's office, control at the level of the director, certification; Forms of control: oral and written questioning, testing, presentation of scientific work, defense of term papers. Current control, final control - exams and tests, defense of the final qualification project
<b>6 – Program competencies</b>	
<b>Integral competence</b>	The ability to solve complex specialized problems and practical problems in the field of software engineering, characterized by uncertain conditions and requirements and implying the carrying out or implementation of innovations.
<b>General competences (GC)</b>	GC 1. Ability to think abstractly, analyze and synthesize. GC2. Ability to conduct theoretical and applied research at the appropriate level GC3. Ability to substantiate and make decisions and develop a strategy of action taking into account human values, personal, public, state and industrial interests GC4. Ability to adapt existing models of information societies in the conditions of implementation of the informatization program of Ukraine GC 5. Ability to motivate people and move toward a common goal, work in a team of employees GC 6. Ability to use software in interpreting and processing research findings GC 7. Creativity, ability to think systematically

	<p>GC 8. Ability to communicate with non-professionals, have certain teaching skills and be able to make informed decisions</p> <p>GC 9. Ability to provide assistance and advice to practitioners and the general public on the practical issues of life safety and emergency protection.</p>
<p><b>Professional competence of the specialty (PC)</b></p>	<p>PC 1. Ability to evaluate the validity of the application of specifications, standards, rules and guidelines in the professional field and adhere to them in the implementation of software life cycle processes.</p> <p>PC 2. Ability to create application software based on modern information technologies and network resources</p> <p>PC 3. Ability to design and coordinate processes, phases, and iterations of software systems lifecycle based on application of relevant software development models, methods, and technologies</p> <p>PC 4. Ability to design software, including modeling its architecture, behavior, and the functioning of individual subsystems and modules</p> <p>PC 5. Ability to substantiate project decisions and manage projects at developing information management systems and technologies</p> <p>PC 6. Ability to deploy server systems virtualization technologies, architectures, and distributed computing communications standards for server virtualization systems capable of forming the enterprise or corporation's private cloud environment</p> <p>PC 7. Ability to apply basic methods and measures to protect information and telecommunication systems against information leakage by technical channels</p> <p>PC 8. Ability to apply the architecture and hardware features of mobile devices and ways to install mobile applications, as well as basic techniques of developing applications for mobile devices</p> <p>PC 9. Ability to apply methodologies for creating information security systems, basic functions, assigning components and principles for building computer security systems, to explain the purpose of individual levels of protection.</p> <p>PC 10. Ability to protect programs and data from unauthorized actions.</p> <p>PC 11. Ability to use the legislative and regulatory framework of the state, as well as the requirements of international standards in professional activity.</p> <p>PC 12. Ability to use information and communication technologies to find new information, create databases, analyze distributed information systems and communication channels based on the analysis of information flows and optimize them.</p> <p>PC 13. Ability to design web-based software products, create dynamic sites, be able to work with <b>LSMS</b></p> <p>PC 14. Ability to develop code for a given program; correct syntax and semantic errors (debug the program).</p> <p>PC 15. Ability to master the basics of building and operating modern computer data transmission systems, classification and characteristics of the data transmission environment, encoding and modulation of data, concepts, models and standards of computer networks, OSI reference model, protocols, standards of communication protocols.</p>
<p><b>7 – Program learning outcomes</b></p>	

- PLO 1.** Know and systematically apply methods of analysis and modeling of the application area, identifying information needs and collecting output data for software design.
- PLO 2.** Evaluate and select methods and models for software development, implementation, operation, and management at all stages of the life cycle.
- PLO 3.** Knowledge of standards, methods and tools for managing the lifecycle of information systems, products and services of information technologies.
- PLO 4.** Develop and evaluate software design strategies.
- PLO 5.** To justify, analyze and evaluate the design decisions made in terms of the quality of the final software product.
- PLO 6.** To choose reasonably paradigms and programming languages for solving applied problems; put into practice system and specialized tools, component technologies (platforms) and integrated software development environments.
- PLO 7.** Ability to use theoretical knowledge and practical skills in mathematics, physics, programming to master theory and methods of protection to ensure information security in information and communication systems
- PLO 8.** Ability to use the capabilities of hardware, operating systems, office and network software systems.
- PLO 9.** Know and navigate international and national standards for information security when designing information security systems.
- PLO 10.** To choose the basic methods and methods of information protection in accordance with the requirements of modern standards on the criteria of information technology security, applying a systematic approach and knowledge of the basics of information security theory.
- PLO 11.** Ability to communicate in the professional field, have business communication skills and teamwork skills
- PLO 12** Know and understand human psychology and use social engineering methods
- PLO 13.** Assess the security of IT systems and networks.
- PLO 14** Assess the potential for IT and network penetration by exploiting existing vulnerabilities.
- PLO 15.** Ability to apply information technology and Internet knowledge.
- PLO 16.** Ability to apply creative abilities that characterize the willingness to create fundamentally new ideas which differ from traditional ones; think systematically.

	<p><b>PLO 17.</b> Ability to implement and maintain Information Retrieval, Data Mining, Text Mining software, apply software methods to efficiently process, store and protect Big Data, including Multimedia and Mulsemmedia .</p> <p><b>PLO 18.</b> Be able to implement and enforce policies in information technology and systems, procedures, and policies.</p> <p><b>PLO 19.</b> Вміти орієнтуватись у схемах алгоритмів, програм, даних і систем.</p> <p><b>PLO 20.</b> Be able to use Internet resources to solve experimental and practical tasks in the field of professional activity.</p> <p><b>PLO 21.</b> Be able to carry out professional activities on the basis of the legislative and regulatory framework of the state, as well as in accordance with national and international requirements and standards in the field of information and cyber security, to provide documentation related to information security.</p> <p><b>PLO 22.</b> Be able to evaluate the methods of transmission of information on channels and communication lines, possible threats of information transmission and means of combating them, to organize the selection of the necessary equipment for noise resistant transmission of information.</p> <p><b>PLO 23.</b> Be able to analyze file systems and system logs.</p> <p><b>PLO 24.</b> Be able to apply the current legislative and regulatory framework in the field of information security to ensure the necessary actions of professional activity.</p>
--	---

### 8 – Resource support for the implementation of the program

<b>Personnel provision</b>	<p>Project team: 2 PhD 1 PhD.</p> <p>All developers are full-time employees of the Kyiv National University of Trade and Economics.</p> <p>The program involves scientific and pedagogical staff with academic degrees and / or academic titles, as well as highly qualified specialists.</p> <p>In order to improve the professional level, all scientific and pedagogical staff are trained once every five years</p>
<b>Material and technical support educational</b>	Use of KNUTE laboratories, computer and specialized audiences
<b>Informational and educational support</b>	MOODLE's learning system and MS Office 365 environment allow students to work independently and individually

### 9 – Academic mobility

<b>National credit mobility</b>	Credit Mobility Organization Project by EPAM SYSTEMS Company, SE "Ukrainian Institute of Intellectual Property", Prokom Certified Training Center, Pearson Education Education Company, Parus Corporation, BGS Group of Companies.
---------------------------------	--



<b>International credit mobility</b>	Organization of credit mobility (except 1st year) of bachelors. University of Paris Est Creteil (Paris, France), Audencia Business School (Nantes, France, Grenoble Alps University (Grenoble, France), University of Central Lancashire (Preston, United Kingdom), University of Hohenheim (Stuttgart, Germany).
<b>Education for foreign applicants for higher education</b>	Provided.

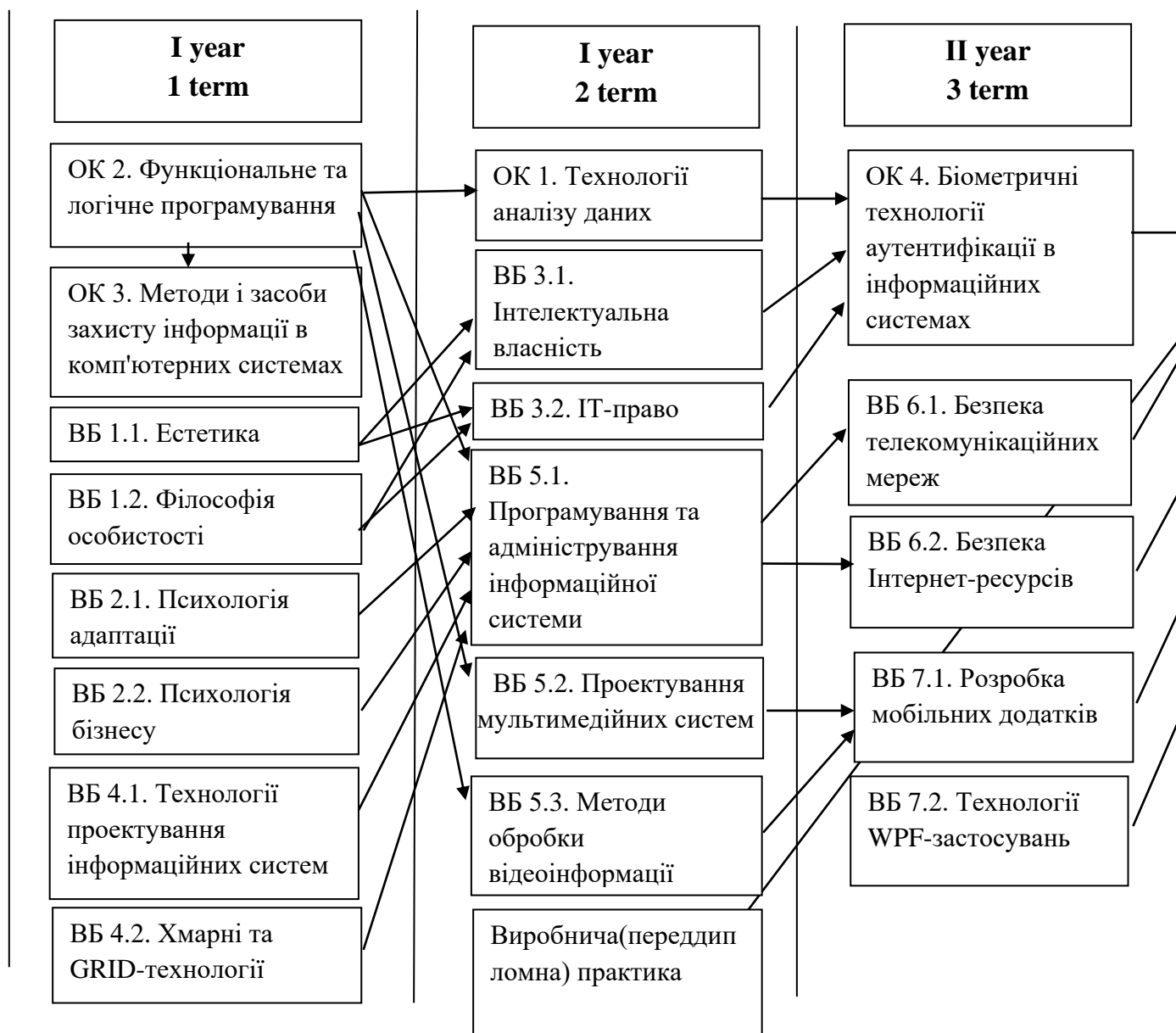
## 2. List of components of the educational program and their logical consistency

### 2.1. List of components of EP

<b>Code e/d</b>	<b>Components of the educational program (educational disciplines, term papers), field experience, final qualification work)</b>	<b>Number of credits</b>	<b>Form of final control</b>
1	2	3	4
<b>1. Compulsory Components of EP</b>			
CC 1	Data analysis technologies	7,5	exam
CC 2	Functional and logical programming	6	exam
CC 3	Methods and means of protection of information in computer systems	6	exam
CC 4	Biometric authentication technologies in information systems	6	exam
Total of Compulsory Components:		<b>25,5</b>	
<b>2. Optional Components of EP</b>			
OP 1.1	Aesthetics	6	exam
OP 1.2	The philosophy of personality	6	exam
OP 2.1	Psychology of adaptation	6	exam
OP 2.2	Business Psychology	6	exam
OP 3.1	Intellectual Property	6	exam
OP 3.2	IT Law	6	exam
<b>OP 4.1.</b>	Information systems design technologies	6	exam
<b>OP 4.2.</b>	Cloud and GRID technologies	6	exam
<b>OP 5.1.</b>	Programming and administration of the enterprise information system	7,5	exam
<b>OP 5.2.</b>	Design of multimedia systems	7,5	exam
OP 5.3.	Methods of video information processing	7,5	exam

1	2	3	4
OP 6.1.	Security of telecommunication networks	6	exam
OP 6.2.	Security of Internet resources	6	exam
OP 7.1.	Mobile application development	6	exam
OP 7.2.	WPF application technologies	6	exam
Total of Optional Components		<b>43,5</b>	
<b>3. Practical studying</b>			
<b>Pregraduate field experience</b>		9	<b>Credit</b>
<b>4. Attestation</b>			
<b>Preparation of the final qualification project and defence</b>		12	Defence
<b>Total of Educational Program</b>		<b>90</b>	

## 2.2. Structural Logic Scheme of Educational Program



### 3. Form of certification of applicants for higher education

Certification of graduates of the educational program "Software Engineering" in the field of knowledge 12 "Information Technology" in specialty 121 "Software Engineering" is carried out in the form of defense of the final qualification project and ends with the issuance of the document of the established sample on the award of his master's degree with the qualification: master's degree specialty "Software Engineering" specialization "Software Engineering".

The attestation shall be open and public.

4. Matrix of compliance of program competencies to the components of the educational program

5.

	ОК 1	ОК 2	ОК 3	ОК 4	ББ 1.1	ББ 1.2	ББ 2.1	ББ 2.2	ББ 3.1	ББ 3.2	ББ 4.1	ББ 4.2	ББ 5.1	ББ 5.2	ББ 5.3	ББ 6.1	ББ 6.2	ББ 7.1	ББ 7.2
ЗК 1	+		+	+							+	+	+	+	+	+			
ЗК 2	+	+		+					+	+	+		+		+	+			
ЗК 3				+	+	+	+	+	+	+	+								
ЗК 4		+			+		+	+	+	+			+	+					
ЗК 5					+	+	+	+	+	+					+				
ЗК 6			+	+							+	+	+	+		+	+	+	+
ЗК 7	+	+							+			+	+	+	+	+			
ЗК 8					+	+	+	+	+	+				+					+
ЗК 9					+	+	+	+	+	+				+					+
ФК 1		+	+	+							+	+	+	+		+	+	+	+
ФК 2				+							+	+	+	+	+	+	+	+	+
ФК 3		+	+	+							+		+	+	+				
ФК 4	+	+		+							+	+	+	+	+	+	+	+	+
ФК 5		+											+	+	+	+			+
ФК 6													+	+		+		+	+
ФК 7			+	+							+	+		+		+			+
ФК 8															+		+	+	+
ФК 9			+									+	+	+	+				+
ФК 10			+	+							+	+		+		+			+
ФК 11									+	+					+				
ФК 12	+	+										+	+	+		+	+		+
ФК 13		+												+	+		+	+	+
ФК 14		+	+										+	+	+	+	+	+	+
ФК 15		+	+										+	+		+			+

6. Provision matrix of program learning outcomes (PLO) with  
relevant components of the educational program

	ОК 1	ОК 2	ОК 3	ОК 4	ВБ 1.1	ВБ 1.2	ВБ 2.1	ВБ 2.2	ВБ 3.1	ВБ 3.2	ВБ 4.1	ВБ 4.2	ВБ 5.1	ВБ 5.2	ВБ 5.3	ВБ 6.1	ВБ 6.2	ВБ 7.1	ВБ 7.2
ПРН 1	+	+											+	+		+			
ПРН 2		+	+	+							+		+	+	+	+	+	+	
ПРН 3			+										+	+	+	+	+	+	
ПРН 4	+	+		+							+		+	+	+	+			
ПРН 5													+	+	+	+	+	+	
ПРН 6														+	+	+	+	+	
ПРН 7			+	+							+	+	+	+		+			+
ПРН 8			+	+							+	+	+	+	+	+			+
ПРН 9			+	+						+	+	+							+
ПРН 10			+	+					+	+	+	+		+	+	+			+
ПРН 11					+	+	+	+	+	+									
ПРН 12						+	+	+											
ПРН 13				+						+	+	+	+	+	+	+			+
ПРН 14			+	+							+	+		+	+				+
ПРН 15	+	+			+	+				+			+	+	+	+	+	+	
ПРН 16	+				+	+	+	+	+	+									
ПРН 17	+	+											+	+	+	+			
ПРН 18		+	+										+	+	+	+	+	+	
ПРН 19		+	+										+	+	+	+	+		
ПРН 20					+	+	+	+	+	+		+			+				+
ПРН 21			+	+					+	+	+	+		+	+	+			+
ПРН 22			+	+					+	+	+	+		+	+	+			+
ПРН 23		+	+										+	+	+	+			
ПРН 24			+	+			+	+	+	+	+	+							+