MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

National Aerospace University. ME Zhukovsky
Kharkiv Aviation Institute

APPROVED
scientific council
National Aerospace University.
named M.E. Zhukovsky
Kharkiv Aviation Institute
« » August 2020, protocol №

EDUCATIONAL PROFESSIONAL PROGRAM

Autonomous navigation and adaptive control systems for aircraft

Level of higher education - First (bachelor's) level

Specialty 173 Avionics

Galuz knowledge 17 Electronics and telecommunications

Higher education: Bachelor of avionics

The educational program is put into operation with "01" September 2020

Rector of the National Aerospace University. M.E. Zhukovsky Kharkiv Aviation Institute

_____ M.V. Nechiporuk
order № from. .2020 p.

Kharkiv 2020

PREFACE

The educational and professional program "Autonomous Navigation Systems and Adaptive Control of Aircraft" in the specialty 173 "Avionics" for the preparation of bachelors was developed by the development and support team of the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" consisting of:

1	Head (guarantor) of the educational program	Kulik AS	- Dr. Tech. Sciences, Professor, Department of Aircraft Control Systems
2	Group members:	Dergachev K. Yu.	- Cand. tech. Sciences, Associate Professor, Senior Researcher, Department of Aircraft Control Systems
3		Zimovin A.Ya.	- Cand. tech. Sciences, Professor, Department of Aircraft Control Systems

b) members of the working group:

1	Beekeeper SM	- Cand. tech. Sciences, Associate Professor, Department of Aircraft Control Systems
2	Dzhulgakov VG	- Associate Professor, Department of Aircraft Control Systems
	Fistula VM	- Professor, Ph.D. Professor, Department of Aircraft Control Systems

Reviews of external stakeholders (if available):

1
2
3

INTRODUCTION

According to Art. 1 "Basic terms and their definitions" of the Law of Ukraine "On Higher Education" from 01.07.2014 № 1556-VII (as amended) educational program - a system of educational components at the appropriate level of higher education within the specialty that determines the requirements for the level of education persons who can start studying under this program, the list of disciplines and the logical sequence of their study, the number of ECTS credits required for this program, as well as the expected learning outcomes (competencies) that must be mastered by the applicant.

The educational program is used during:

– accreditation of the educational program, inspection of educational activity by specialty and specialization;

– curriculum development, curricula and practices;

– development of diagnostic tools for the quality of higher education;

– determining the content of training in the system of retraining and advanced training;

– professional orientation of applicants for the specialty.

Educational and professional program takes into account the requirements of the Law of Ukraine "On Higher Education" from 01.07.2014 № 1556-VII (as amended), Resolution of the Cabinet of Ministers of Ukraine "On approval of the National Qualifications Framework" from 23.11.2011 № 1341 and establishes:

– volume and term of study of bachelors;

– general competencies;

– professional competencies;

– program learning outcomes;

– the list and volume of academic disciplines for mastering the competencies of the educational-professional program;

– requirements for the structure of academic disciplines.

Educational and professional program is used for:

– drawing up curricula and working curricula;

– formation of individual plans of students;

– formation workers programs of academic disciplines, practices;

– determination of the information base for the formation of diagnostic tools;

– accreditation of educational and professional program;

– internal and external quality control of training;

– certification of bachelors according to the educational-professional program "Autonomous navigation systems and adaptive control of aircraft" in the specialty 173 "Avionics".

Users of the educational and professional program:

– applicants for higher education studying at the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute";

– scientific and pedagogical workers who train bachelors in the educational and professional program "Autonomous navigation systems and adaptive control of aircraft" in the specialty 173 "Avionics";

– examination commission of specialty 173 "Avionics";

– Admissions Committee of the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute".

The educational and professional program extends to the departments of the University involved in the training of bachelor's degree specialists in the educational and professional program "Autonomous navigation and adaptive control systems for aircraft"In specialty 173" Avionics ".

1 REGULATORY REFERENCES

The educational and professional program is developed on the basis of the following regulations and recommendations:

1.1 Law of Ukraine "On Higher Education". № 1556-UII dated 01.07.2014 (as amended).

1.2 Resolution of the Cabinet of Ministers of Ukraine "On approval of the National Qualifications Framework" dated 23.11.2011 № 1341.

1.3 Resolution of the Cabinet of Ministers of Ukraine "On approval of the list of branches of knowledge and specialties in which the training of higher education seekers" from 29.04.2015 № 266.

1.4 Resolution of the Cabinet of Ministers of Ukraine "On approval of the Regulations on the procedure for exercising the right to academic mobility" dated 12.08.2015 № 579.

1.5 National Classifier of Ukraine. Classifier of professions DK 003: 2010, approved by the order of Derzhspozhyvstandart of Ukraine dated 28.07.2010 № 327 (as amended).

1.6 Methodical recommendations for the development of standards of higher education, approved by the sector of higher education of the Scientific and Methodological Council of the Ministry of Education and Science of Ukraine protocol from 21.06.2019 № 3 (Approved by the order of the MES of Ukraine from 01.10.2019 (1254).

1.7 Regulation "On the organization of the educational process" SUYA KHAI-NOV-P / 005: 2016 of the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute", approved by the Academic Council of the University on 18.05.2016, protocol № 10.

1.8 A Tuning Guide to Formulating Degree Program Profiles Including Program Competences and Program Learning Outcomes. -Bilbao, Groningen and The Hague, 2010.

1.9 A TUNING-AHELO conceptual framework of expected / desired learning outcomes in engineering. OECD Education Working Papers, No. 60, OECD Publishing 2011.http://dx.doi.org/10.1787/5kghtchn8mbn-en

1.10 National Qualifications Framework. Appendix to the Resolution of the Cabinet of Ministers of Ukraine of November 23, 2011 № 1324.

1.11 Development of educational programs. Methodical recommendations / Author: VM Zakharchenko, VI Lugovyi, Yu.M. Рашкевич, Ж.В. Talanova / Ed. V.G. Flint. - Kyiv: State Enterprise "Priorities", 2014. - 120 p.

1.12 Order of the Ministry of Education and Science of Ukraine "On the peculiarities of the introduction of the list of branches of knowledge and specialties for which higher education is approved, approved by the Cabinet of Ministers of Ukraine dated April 29, 2015 № 266" dated 06.11.2015 № 1151.

1.13 Classification of economic activities: DK 009: 2010. - Valid from 01.01.2012. - (National Classifier of Ukraine).

1.14 Classifier of professions: DK 003: 2010. - Valid from 01.11.2010. - (National Classifier of Ukraine).

1.15 National educational glossary: higher education / 2nd ed., Revised. and ext. / Author: VM Захарченко, C.A. Kalashnikov, VI Луговий, A.B. Stavytsky, Yu.M. Рашкевич, Ж.В. Talanova / Ed. V.G. Flint. - Kyiv: Pleiades Publishing House LLC, 2014. - 100 p.

1.16 Standard of higher education in Ukraine: first (bachelor's) level, field of knowledge 17 "Electronics and Telecommunications", specialty 173 "Avionics". - 14 p. Approved and put into effect by the order of the Ministry of Education and Science

of Ukraine dated 04.03.2020 № 385.

2 PROFILE OF THE EDUCATIONAL PROFESSIONAL PROGRAM "AUTONOMOUS NAVIGATION SYSTEMS AND ADAPTIVE CONTROL OF AIRCRAFT" FROM THE SPECIALTY 17

1 - General information	
Full name of the higher educational institution and structural subdivision	National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" Department of Aircraft Control Systems
Degree of higher education and title of qualification in the original language	Degree of higher education - Bachelor Qualification: Bachelor of avionics in the educational-professional program "Autonomous navigation systems and adaptive control of aircraft" Qualification: Master in avionics on Educational Program “Systems of autonomous navigation and adaptive control of aircrafts”
The official name of the educational and professional program	Autonomous navigation and adaptive control systems for aircraft Systems of autonomous navigation and adaptive control of aircrafts
Type of diploma and scope of educational and professional program	Bachelor's degree, single / 240 ECTS credits / 4 rivers
Availability of accreditation	Accreditation certificate: UD series № 21008334 issued on January 25, 2019 by the order of the Ministry of Education and Science of Ukraine dated 15.07.2014 №26421 (based on the order of the Ministry of Education and Science of Ukraine dated 19.12.2016 № 1565) Accreditation period: until 01.07.2024
Cycle / level	The first (educational and professional) level. NRC of Ukraine - level 7. FQ-EHEA - the first cycle, EQF-LLL - 6 level
Prerequisites	A person has the right to obtain a bachelor's degree provided that they have completed general secondary education.
Language (s) of instruction	The language of instruction is the state language. In order to create conditions for international academic mobility, it may be decided to teach one or more subjects in English and / or other foreign languages, while providing knowledge to applicants. relevant discipline in the state language.
Validity of the educational and professional program	Before the introduction of a new educational program
Internet address of the permanent placement of the description of the educational-professional program	https://khai.edu/ua/education/osvitni-programi-i-komponenti/osvitni-programi-bakalavriv/
2 - The purpose of the educational program	
1. To provide theoretical knowledge and practical skills sufficient for successful performance of professional duties under the educational-professional program "Autonomous navigation and adaptive control systems for aircraft", Specialty 173" Avionics ". 2. Formation of the personality of a specialist capable of using professional knowledge and practical skills to solve problems in the field of navigation systems, automated and automatic control systems for autonomous mobile objects, aviation and rocket and space objects and systems.	

3 - Characteristics of the educational and professional program	
Subject area	***Objects of study and / or activity***: automated and automatic control systems for aviation and rocket and space objects and systems, their information support. ***Learning objectives***: training of specialists who are able to solve complex specialized problems and practical problems of use and implementation of avionics systems and devices, characterized by complexity and uncertainty of conditions. ***Theoretical content of the subject area***: concepts, concepts, principles in the field of flight dynamics, aircraft control systems, electronic and microprocessor technology of avionics and navigation systems. ***Methods, techniques and technologies****:* methods, techniques, technologies of design, research and testing of avionics systems. ***Tools and equipment****:* stands and simulation software packages for modeling avionics systems; information and measuring systems and devices; automatic control systems, computers, microprocessor control systems for onboard and ground equipment.
Orientation of the educational-professional program	Educational and professional
The main focus of the educational and professional program (specialization)	The educational-professional program establishes qualification requirements for social and production activities of graduates of higher education institutions in the specialty 173 "Avionics" of the bachelor's degree and state requirements for the properties and qualities of a person who has obtained a certain educational level in the educational-professional program "Autonomous navigation and adaptive control systems for aircraft».
Features of the program	The practice is carried out at enterprises of various industries
4 - Suitability of graduates for employment and further study	
Suitability for employment	Bachelors in 173 "Avionics" can hold positions in accordance with the National Classification of Occupations of Ukraine: Classifier of Professions (DK 003: 2010) and International Standard Classification of Occupations 2008 (ISCO-08)).
Further training	A person has the right to continue his / her education according to an educational-professional or educational-scientific program of a master's degree. Acquisition of additional qualifications in the system of postgraduate education ..
5 - Teaching and assessment	
Teaching and learning	Lectures, multimedia lectures, laboratory work, practical classes in small groups, independent work on the basis of textbooks and abstracts, consultations with teachers, preparation of qualifying bachelor's thesis. Student-centered learning, self-study, problem-oriented learning aimed at the development of critical and creative thinking, learning through laboratory practice, distance education and more.
Evaluation	Written exams, practice reports, presentations, final and current (modular) control, bachelor's thesis and its defense.
6 - Program competencies	
Integral competence	Ability to solve complex specialized problems and practical problems of avionics and control systems during professional activities and in the learning process, which involves the application of theories and methods of engineering and is characterized by complexity and uncertainty of conditions.
General competence (LC)	LC 1. Ability to apply knowledge in practical situations. LC 2. Ability to search, process and analyze information. LC 3. Ability to identify, pose and solve problems.

	LC 4. Knowledge and understanding of the subject area and understanding of professional activity. LC 5. Ability to communicate in the state language both orally and in writing. LC 6. Ability to communicate in a foreign language. LC 7. Ability to exercise their 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. LC 8. Ability to preserve and multiply 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, technology and technology, use different types and forms physical activity for active recreation.
Professional competencies of the specialty (FC)	FC 1. Ability to carry out professional activities in the field of avionics autonomously and responsibly, adhering to the legislative and regulatory framework, as well as state and international requirements. FC 2. Ability to use the basics of electronics, circuitry in solving practical problems of avionics. FC 3. Ability to develop and program microprocessor control systems. FC 4. Ability to analyze and synthesize aircraft control systems. FC 5. Ability to develop aircraft avionics and systems of ground complexes using information technology. FC 6. Ability to mathematically describe and model physical processes in aircraft control systems. FC 7. Ability to design avionics devices and systems using automated systems. FC 8. Ability to describe and use modern technologies for the manufacture of avionics systems. FC 9. Ability to assess the technical and economic characteristics of avionics systems and devices. FC 10. Ability to justify decisions, work effectively autonomously and as part of a team.
7 - Program learning outcomes	
	PRN 1 Adapt to changes in professional technologies, predict their impact on the end result. PRN 2 Autonomously receive new knowledge in their subject and related areas from various sources to effectively solve specialized problems of professional activity. PRN 3 Responsibly and competently set and solve problems related to the creation of avionics devices and systems. PRN 4 Understand the state and prospects of the subject area. PRN 5 To organize own professional activity, to choose optimum methods and ways of the decision of difficult specialized problems and practical problems in professional activity. PRN 6 Critically comprehend the basic theories, principles, methods and concepts in professional activity. PRN 7 Communicate freely on professional issues in state and foreign languages orally and in writing. PRN 8 Understand the principles of law and legal principles of professional activity in the field of avionics. PRN 9 Understanding of modern philosophical theories and the main achievements of world and national culture, their creative comprehension and skills of application in professional activity, in particular, at communication with colleagues.

	PRN 10 Effectively plan and organize their working hours, maintain their own health and ability to work, including through active recreation and a healthy lifestyle. PRN 11 Develop technical requirements for avionics systems and devices; carry out the design of avionics systems and devices taking into account the requirements of the customer and regulatory and technical documentation. PRN 12 Analyze, calculate and design electrical and electronic avionics systems. PRN 13 Develop and program microprocessor control systems. PRN 14 Apply modern information technologies to ensure the functioning of aircraft and ground complexes. PRN 15 Develop mathematical models of aircraft as control objects. PRN 16 Be able to describe information processes related to avionics, analyze their noise immunity. PRN 17 Be able to create electronic equipment and devices of aircraft and ground complexes using computer-aided design systems. PRN 18 To provide manufacturability of manufacturing avionics systems by modern design, including automated and experimental, means. PRN 19 Evaluate the technical and economic characteristics of the decisions taken to ensure the efficiency and high quality of development.
8 - Resource support for program implementation	
Staffing	Research and teaching staff involved in the teaching of professionally oriented disciplines have academic degrees and / or academic titles and meet licensing requirements.
Material and technical software	Training is carried out in training laboratories, computer classes (list which are available)
Information and educational and methodical software	The use of virtual learning environment of the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" and author's developments of scientific and pedagogical staff.
9 - Academic mobility	
National credit mobility	Based on bilateral agreements between the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" and technical institutions of Ukraine.
International credit mobility	Based on bilateral agreements between the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" and educational institutions of partner countries.
Training of foreign applicants for higher education	Education of foreign citizens is carried out in the state or English languages. If education is conducted in the state language, then in certain cases it may be decided to teach one or more subjects in English and / or other foreign languages, while providing knowledge to applicants. relevant discipline in the state language.

3 LIST OF COMPONENTS OF THE EDUCATIONAL PROFESSIONAL PROGRAM (COP) AND THEIR LOGICAL SEQUENCE

3.1 List of OP components

COP code	Components of the educational program (academic disciplines, course projects (works), practices, qualification work)	Number of credits	Form final control
1	2	3	4
Mandatory components of the OP			
OK1.1	Mathematics by sections	5	Exam
OK1.2	Mathematics by sections	5	Exam
OK1.3	Mathematics by sections	5	Exam
OK2	Physics	7	Exam
OK3.1	Algorithmization and programming	6.5	Exam
OK3.2	Algorithmization and programming	6	Exam
OK4	Engineering and computer graphics	5	Test
OK5	Entry to the profession	6	Test
OK6	Fundamentals of metrology	4.5	Test
OK7.1	Object-oriented design of avionics systems	5.5	Exam
OK7.2	Object-oriented design of avionics systems (course work)	2	Diff. test
OK8	Electrical engineering	5	Exam
OK9	Technical mechanics (Applied mechanics and basics of design)	4	Exam
OK10.1	Electronics and basics of circuitry	5	Exam
OK10.2	Electronics and basics of circuitry	4.5	Exam
OK11.1	Basics of navigation	5	Test
OK11.2	Basics of navigation	5	Exam
OK11.3	Basics of navigation (course work)	2	Diff. test
OK12.1	Fundamentals of modeling of avionics systems	5	Test
OK12.2	Fundamentals of modeling of avionics systems	4.5	Exam
OK13.1	Theory of automatic control	5	Exam
OK13.2	Theory of automatic control	5	Exam
OK13.3	Theory of automatic control (course project)	2	Diff. test
OK14	Methods of calculations and modeling on a computer	5	Exam
OK15	Drives of avionics systems	4	Test
OK16.1	Microcontrollers in control systems	4.5	Exam
OK16.2	Microcontrollers in control systems	3	Exam
OK17.1	Aircraft control systems	5	Exam
OK17.2	Aircraft control systems	3	Exam
OK18	Onboard networks of avionics systems	4	Test
OK19	BJD, labor protection and civil protection	4	Test
OK20.1	Design of control systems	3.5	Exam
OK20.2	Design of control systems	3.5	Exam
OK20.3	Design of control systems (course project)	2	Diff. test
OK21	Theory of digital control systems	3	Test
OK22	Economics and management of the enterprise	4	Exam
OK23	Technology of avionics systems production	3	Test
OK24	Educational practice	3	Test
OK25	Introductory practice	3	Test
OK26	Internship	3	Test
OK27	Thesis (project) bachelor	9	Defense of qualifying bachelor's thesis

The total amount of mandatory components:		**179**	
Selective components of OP			
WB1.1.1	Foreign Language	**3**	**Test**
WB2.1.1	Foreign Language		
WB1.1.2	Foreign Language	**3**	**Diff. test**
WB2.1.2	Foreign Language		
WB1.2	**Ukrainian language (for professional purposes)**	**3**	**Test**
WB2.2	Fundamentals of professional Ukrainian-language communication		
WB1.3	**science of law**	**3**	**Test**
WB2.3	Constitutional rights and freedoms of man and citizen		
WB1.4	**Humanities discipline chosen by the applicant**	**3**	**Test**
WB2.4	**Humanities discipline chosen by the applicant**		
WB1.5	**Genesis of philosophical knowledge**	**3**	**Test**
WB2.5	**Philosophy of science**		
WB1.6	**Psychology in professional activity**	**3**	**Test**
WB2.6	**Psychology of business communication**		
WB1.7	**Mathematical foundations of digital avionics systems**	**5**	**Exam**
WB2.7	**Engineering methods of digital data processing**		
WB1.8.1	**Information and measuring devices of avionics**	**5**	**Exam**
WB2.8.1	**Sensors: structure and circuitry**		
WB1.8.2	**Information and measuring devices of avionics**	**3**	**Exam**
WB2.8.2	**Sensors: structure and circuitry**		
WB1.8.3	**Avionics information and measuring devices (course project)**	**2**	**Diff. test**
WB2.8.3	**Sensors: structure and circuitry (course project)**		
WB1.9.1	**Autonomous navigation systems**	**5**	**Exam**
WB2.9	**Development of robots and devices on the Arduino platform**		
WB1.9.2	**Autonomous navigation systems**	**5**	**Exam**
WB2.13	**Geographic information systems in avionics**		
WB1.10	**Aerodrome equipment**	**5**	**Test**
WB2.10	**Building databases on Phyton**		
WB1.11	**Fundamentals of air traffic control**	**5**	**Test**
WB2.11	**Information protection in avionics systems**		
WB1.12	**Automation of information and control processes**	**5**	**Exam**
WB2.12	**Automation of avionics systems design**		
The total amount of sample components:		**61**	
TOTAL VOLUME OF THE EDUCATIONAL PROGRAM		**240**	

3.2 Structural and logical scheme of OP

The structural and logical scheme of the educational program reflects the sequence of studying its components and is given in Annex A. The scheme contains mandatory and optional components. From the sample component, the applicant chooses one of the two components, identical in the number of credits and the form of final control.

3.3 The structure of the curriculum by semesters and the content of the components of OP

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
And the semester					
1	**OK1.1**	**Mathematics by sections**	**Goal:** to form in applicants professional competencies in the application of mathematical methods in professional activities **Task:** formation of a system of professional knowledge and practical skills in linear algebra and analytical geometry, differential and integral calculus, series theory, operational calculus, calculus of variations, probability theory, mathematical statistics and the theory of random processes, numerical methods	ZK1 ZK2	FC6
2	**OK3.1**	**Algorithmization and programming**	**Goal:** mastering by students of methods and means of designing and realization of algorithms of data processing, and also the structural approach to construction of the software of computerized systems **Task**: study of algorithm design methods, mastering of syntactic constructions in high - level programming languages, as well as acquisition of software design and implementation skills.	ZK1 ZK2	FC5 FC6
3	**OK4**	**Engineering and computer graphics**	**Goal**: mastering by applicants of principles of execution of design documentation with application of computer technologies **Task:** formation of applicants' professional knowledge and practical skills in design documentation (ESKD), execution of parts and assemblies in accordance with ESKD, general principles of application of integrated computer technology, use of standard software products in the development of design documentation, use of ESKD and ESPD in the implementation of reporting documentation	ZK1 ZK2	FC5 FC7
4	**OK5**	**Entry to the profession**	**Goal**: provide general ideas about the object and subject of the specialty. Develop the ability to conduct research on the properties of the simplest automatic control systems and basic skills of professional communication. **Task**: to give students a systematic knowledge of subjects and objects of the specialty, to acquaint with the scope of avionics systems, as well as engineering of mobile applications, navigation systems, technical vision systems, basic control principles, automatic control systems, ACS characteristics, applied mathematical programs (Matlab, Maple)	ZK1 ZK2 ZK4	FC1 FC4

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
5	**WB1.1.1**	**Foreign Language**	**Goal:** deep mastering by students of grammar and phonetic norms of a foreign language, mastering of stable skills of free communication. **Task:** formation of students' professional knowledge and practical skills in phonetic norms of a foreign language, normative grammar of a foreign language, listening, speaking, reading, language etiquette, elements of oral and written translation of information in a foreign language, analysis of professionally oriented foreign sources, electronic foreign sources	ZK1 ZK6	FC1 FC10
6	**WB1.2**	**Ukrainian language (for professional purposes)**	**Goal**: improvement of students' skills of fluency in the Ukrainian language and its application in the field of professional activity **Task:** formation of applicants' professional knowledge and practical skills in the appointment and classification of business documents, the rules of their design in the state language, functional style of Ukrainian scientific and technical literature in the specialty, language interaction, varieties of languages, norms, elements of different language levels, spoken language, professionally oriented of lexical material for the description of professionally-oriented branch, professionally-oriented lexical-grammatical minimum	ZK1 ZK5	FC1 FC10
7	**WB2.1.1**	**Foreign Language**	**Goal:** deep mastering by students of grammar and phonetic norms of a foreign language, mastering of stable skills of free communication. **Task:** formation of students' professional knowledge and practical skills in phonetic norms of a foreign language, normative grammar of a foreign language, listening, speaking, reading, language etiquette, elements of oral and written translation of information in a foreign language, analysis of professionally oriented foreign sources, electronic foreign sources	ZK1 ZK6	FC1 FC10
8	**WB2.2**	Fundamentals of professional Ukrainian-language communication	**Goal**: improvement of students' skills of fluency in the Ukrainian language and its application in the field of professional activity **Task:** formation of applicants' professional knowledge and practical skills in the appointment and classification of business documents, the rules of their design in the state language, functional style of Ukrainian scientific and technical literature in the specialty, language interaction, varieties of languages, norms, elements of different language levels, spoken language, professionally oriented of lexical material for	ZK1 ZK5	FC1 FC10

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			the description of professionally-oriented branch, professionally-oriented lexical-grammatical minimum		
II semester					
9	**OK1.2**	**Mathematics by sections**	**Goal:** to form in applicants professional competencies in the application of mathematical methods in professional activities **Task:** formation of a system of professional knowledge and practical skills in linear algebra and analytical geometry, differential and integral calculus, series theory, operational calculus, calculus of variations, probability theory, mathematical statistics and the theory of random processes, numerical methods	ZK1 ZK2	FC6
10	**OK2**	**Physics**	**Goal:** to form in applicants of competence in the application of modern physics in professional activities, ideas about the modern physical picture of the world, to provide knowledge about the most important principles and laws that determine the structure and forms of motion of matter, preparing them for quality study of general and special disciplines **Task:** formation of applicants' system of professional knowledge and practical skills in the application of methods of mechanics, oscillations and waves, electricity and magnetism, wave optics, heat engineering, thermodynamics for the analysis of technical objects	ZK1 ZK2 ZK4	FC6
11	**OK3.2**	**Algorithmization and programming**	**Goal:** mastering by students of methods and means of designing and realization of algorithms of data processing, and also the structural approach to construction of the software of computerized systems **Task**: study of algorithm design methods, mastering of syntactic constructions in high - level programming languages, as well as acquisition of software design and implementation skills.	ZK1 ZK2	FC5 FC6
12	**OK6**	**Foundations metrology**	**Goal:** mastering by applicants of basic competencies in the field of metrological support of design of control systems and application of modern standards **Task**: formation of applicants' professional knowledge and practical skills on the theoretical foundations of metrology, basic concepts, means of measurement and patterns of formation of measurement results, measurement errors, algorithms for	ZK1 ZK2 ZK4	FC6 FC9

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			processing multiple measurements, metrological support; structure and functions of metrological services, standardization, its legal bases, international organizations on standardization; systems of standards, certification, the concept of product quality, consumer protection; rules and procedures for certification; certification of quality systems in Ukraine		
13	**OK24**	**Educational practice**	**Goal**: providing knowledge on the preparation of student work in compliance with the accepted requirements for information resources. **Task:** acquaintance with the organization of information and Internet resources, the simplest means of access to them, rules of drawing up of the general components of student's works, performance of a practical task	ZK1 ZK2 ZK4 ZK5	FC1 FC10
14	**WB1.1.2**	**Foreign Language**	**Goal:** deep mastering by students of grammar and phonetic norms of a foreign language, mastering of stable skills of free communication. **Task:** formation of students' professional knowledge and practical skills in phonetic norms of a foreign language, normative grammar of a foreign language, listening, speaking, reading, language etiquette, elements of oral and written translation of information in a foreign language, analysis of professionally oriented foreign sources, electronic foreign sources	ZK1 ZK6	FC1 FC10
15	**WB1.3**	**science of law**	**Goal:** assimilation by applicants of the context of the basic norms and tendencies in a modern society concerning jurisprudence **Task:** formation of applicants' basic knowledge and practical skills in the application of modern law in professional communication and everyday life	ZK1 ZK2 ZK5 ZK7	FC1 FC10
16	**WB2.1.2**	**Foreign Language**	**Goal:** deep mastering by students of grammar and phonetic norms of a foreign language, mastering of stable skills of free communication. **Task:** formation of students' professional knowledge and practical skills in phonetic norms of a foreign language, normative grammar of a foreign language, listening, speaking, reading, language etiquette, elements of oral and written translation of information in a foreign language, analysis of professionally oriented foreign sources, electronic foreign sources	ZK1 ZK6	FC1 FC10

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
17	**WB2.3**	Constitutional rights and freedoms of man and citizen	**Goal:** assimilation by applicants of the context of the basic norms and tendencies in a modern society concerning maintenance and observance of the constitutional rights and freedoms of the person and the citizen **Task:** formation of applicants' basic knowledge and practical skills in ensuring and observing the constitutional rights and freedoms of man and citizen in professional communication and everyday life	ZK1 ZK2 ZK5 ZK7	FC1 FC10
III semester					
18	**OK1.3**	**Mathematics by sections**	**Goal:** to form in applicants professional competencies in the application of mathematical methods in professional activities **Task:** formation of a system of professional knowledge and practical skills in linear algebra and analytical geometry, differential and integral calculus, series theory, operational calculus, calculus of variations, probability theory, mathematical statistics and the theory of random processes, numerical methods	ZK1 ZK2	FC6
19	**OK7.1**	**Object-oriented design of avionics systems**	**Goal:** formation of applicants' basic knowledge and skills required in the construction of object-oriented software for the design and implementation of aircraft control systems. **Task:** gaining skills in the development of object-oriented programs with a graphical user interface to perform design tasks for the construction of control systems for aircraft, namely engineering calculations, plotting functions, obtaining and processing photos and videos	ZK1 ZK2 ZK3 ZK4	FC6 FC7 FC10
20	**OK8**	**Electrical engineering**	**Goal:** mastering by applicants of principles of application of laws of electrical engineering for designing of automation systems **Task**: formation of applicants' professional knowledge and practical skills in the basic laws of electrical engineering, the theory of electromechanical systems	ZK1 ZK2 ZK4	FC2 FC6
21	**OK10.1**	**Electronics and basics of circuitry**	**Goal:** mastering by applicants of theoretical bases of construction of elements of electronic equipment, principles of their work and principles of work of modern electronic devices. **Task:** to give students systematized knowledge and practical skills in the formation of circuit solutions in the construction of automatic control system of aircraft, the choice of functional electronic	ZK1 ZK2 ZK4	FC2 FC6

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			elements, experimental study of the functional properties of electronic devices and circuits		
22	**OK11.1**	**Basics of navigation**	**Goal:** study of methods of obtaining information about the location of moving objects and their trajectories on the basis of various navigation methods and principles of operation of navigation systems. **Task:** to give students systematic knowledge related to the application of various methods of calculations and modeling used in the navigation of moving objects using modern computer technology	ZK1 ZK2 ZK4	FC1 FC6
23	**WB1.4**	**Humanities discipline chosen by the applicant**	**Goal**: assimilation by applicants of the context of the basic norms and tendencies in a modern society concerning one of disciplines: - Culturology - Logic - Sociology - Ukrainian Studies **Task:** formation of applicants' basic knowledge and practical skills in the application of one of the disciplines in professional communication and everyday life: - Culturology - Logic - Sociology - Ukrainian Studies	ZK1 ZK2 ZK5 ZK8	FC1
24	**WB2.4**	**Humanities discipline chosen by the applicant**	**Goal**: assimilation by applicants of the context of the basic norms and tendencies in a modern society concerning one of disciplines: - Culturology - Logic - Sociology - Ukrainian Studies **Task:** formation of applicants' basic knowledge and practical skills in the application of one of the disciplines in professional communication and everyday life: - Culturology - Logic - Sociology - Ukrainian Studies	ZK1 ZK2 ZK5 ZK8	FC1
IV semester					
25	**OK7.2**	**Object-oriented design of**	**Goal:** formation of applicants' basic knowledge and skills required in the construction of object-oriented software for	ZK1 ZK2	FC6 FC7

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
		avionics systems **(Coursework)**	the design and implementation of aircraft control systems. **Task:** gaining skills in the development of object-oriented programs with a graphical user interface to perform design tasks for the construction of control systems for aircraft, namely engineering calculations, plotting functions, obtaining and processing photos and videos	ZK3 ZK4	FC10
26	**OK9**	**Theory of circuits and electrical signals**	**Goal:** mastering by applicants of the basic laws of the theory of circuits, the general methods of calculation of electric circuits and the analysis of signals **Task**: formation of applicants' professional knowledge and practical skills in the application of the laws of circuit theory and the principles of calculation of electrical circuits, experimental obtaining of the characteristics of electrical signals and their analysis	ZK1 ZK2 ZK4	FC2 FC6
27	**OK10.2**	**Electronics and basics of circuitry**	**Goal:** mastering by applicants of theoretical bases of construction of elements of electronic equipment, principles of their work and principles of work of modern electronic devices. **Task:** to give students systematized knowledge and practical skills in the formation of circuit solutions in the construction of automatic control systems, the choice of functional electronic elements, experimental study of the functional properties of electronic devices and circuits	ZK1 ZK2 ZK4	FC2 FC6
28	**OK11.2**	**Basics of navigation**	**Goal:** study of methods of obtaining information about the location of moving objects and their trajectories on the basis of various navigation methods and principles of operation of navigation systems. **Task:** to give students systematic knowledge related to the application of various methods of calculations and modeling used in the navigation of moving objects using modern computer technology	ZK1 ZK2 ZK4	FC1 FC6 FC10
29	**OK12.1**	**Fundamentals of modeling of avionics systems**	**Goal**: to acquaint applicants with the basic concepts, definitions, ideas, principles and methods of modeling of control systems and to carry out with their help research of dynamic properties of objects of automatic control **Task:** obtaining skills of construction of verbal, graphic, mathematical, machine models and experimental research of	ZK1 ZK2 ZK4	FC4 FC6

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			functional properties of objects of automatic control, the decision of problems of structural and parametric identification of mathematical model in time and frequency areas		
30	**OK25**	**Introductory practice**	**Goal:** acquisition by applicants and consolidation of theoretical knowledge and practical skills of using measuring equipment in the regulation, adjustment and testing of electronic equipment of control systems with subsystems of technical vision. **Task:** acquaintance with industrial means of measuring equipment and gaining practical experience in measuring the characteristics of electrical quantities and signals	ZK1 ZK2 ZK4 ZK5	FC1 FC9 FC10
31	**WB1.5**	**Genesis of philosophical knowledge**	**Goal**: formation of a holistic worldview concept in applicants **Task:** formation of students' professional knowledge and practical skills in the subject of philosophy, main directions, schools, stages of historical development, the system of philosophical categories; the concept of material and ideal, determinism and indeterminism, the typology of philosophical systems; problems of the world and man in world philosophical thought and philosophical thought of Ukraine; religion and morality, religion and politics, ethics and ethical values	ZK2 ZK4 ZK5 ZK8	FC1 FC10
32	**WB1.7**	**Mathematical foundations of digital avionics systems**	**Goal:** mastering by applicants of the basic mathematical principles applied at construction and functioning of digital control systems of LA, acquaintance with engineering methods of data processing in this field of technology. **Task**: formation of applicants' professional knowledge and practical skills in applying the laws of logic algebra, formalization and transformation of logical functions, the simplest methods of data filtering, numerical methods of interpolation, extrapolation and search for optimal solutions in information processing in digital aircraft control systems	ZK1 ZK2 ZK4	FC6
33	**WB2.5**	**Philosophy of science**	**Goal**: formation of a holistic worldview concept in applicants **Task:** formation of applicants' professional knowledge and practical skills with problems of consciousness in philosophy and science; philosophical problems of scientific knowledge; forms and methods of scientific knowledge; modern worldview in the public consciousness; human place in the system of	ZK1 ZK2 ZK5 ZK8	FC1 FC10

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			social relations; cognitive processes, thinking, intelligence, creativity, practical criteria of science; religious values, freedom of conscience, consciousness. Modern world religions, the interaction of religion and science,		
34	**WB2.7**	Engineering methods of digital data processing	**Goal:** mastering by applicants of methods of analytical research of mathematical models (correctness, completeness, complexity, stability of the decision), algorithms of machine solution of difficult mathematical problems. **Task**: formation of applicants' professional knowledge and practical skills in the methods of set theory, logic algebra, inference theory, graph theory, finite automata; research of algorithms of formation of the software decision of problems in digital systems LA management	ZK1 ZK2 ZK4	FC6
V semester					
35	**OK13.1**	**Theory of automatic control**	**Goal:**study of the basic provisions, theoretical bases of development of modern systems of automatic control; modern principles, schemes and methods of building control systems, their characteristics **Task:** acquisition by students of skills of formation of structure of system of automatic control, development of functional and structural schemes, construction of mathematical models of functional elements, the decision of problems of the analysis and synthesis of system, experimental research of functional properties of system	ZK1 ZK2 ZK4	FC4 FC6 FC10
36	**OK14**	**Methods of calculations and modeling on a computer**	**Goal:** formation of applicants' basic knowledge and skills related to the application of methods of calculation and modeling on a computer during the design of the basic elements of control systems **Task**: to give students a systematic knowledge related to the application of various methods of calculations and modeling used in the design of basic elements of control systems using modern computer technology	ZK1 ZK2 ZK4	FC5 FC6
37	**OK11.3**	**Basics of navigation (course work)**	**Goal:** study of methods of obtaining information about the location of moving objects and their trajectories on the basis of various navigation methods and principles of operation of navigation systems. **Task:** to give students systematic knowledge related to the application of various methods	ZK1 ZK2 ZK4	FC1 FC6 FC10

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			of calculations and modeling used in the navigation of moving objects using modern computer technology		
38	**OK12.2**	**Fundamentals of modeling of avionics systems**	**Goal**: to acquaint applicants with the basic concepts, definitions, ideas, principles and methods of modeling of control systems and to carry out with their help research of dynamic properties of objects of automatic control **Task:** obtaining skills of construction of verbal, graphic, mathematical, machine models and experimental research of functional properties of objects of automatic control, the decision of problems of structural and parametric identification of mathematical model in time and frequency areas	ZK1 ZK2 ZK4	FC4 FC6
39	**OK15**	**Drives of avionics systems**	**Goal:** to study the basic provisions, physical principles of operation of electric, hydraulic and pneumatic actuators, their static and dynamic characteristics; features of the use of actuators in aircraft control systems **Task**: obtaining skills of analysis of characteristics and methods of calculations of drives of aircraft control systems, providing remote control of them, mastering methods of mathematical description of drives of different types used in aircraft control systems	ZK1 ZK2 ZK4	FC4 FC6 FC9
40	**WB1.6**	**Psychology in professional activity**	**Goal**: assimilation by applicants of the context of the basic psychological norms and tendencies in a modern society **Task:** formation of professional knowledge and practical skills in the historical development of psychological knowledge, the creation of conflict-free relationships in the team, personality psychology, between personal relationships and interactions, the role of leader and its impact on human consciousness, psychology of small groups and regulation of behavior and behavior, common norms of behavior and morality	ZK1 ZK4 ZK7 ZK8	FC1 FC10
41	**WB1.8.1**	**Information and measuring devices of avionics systems**	**Goal:** mastering by applicants of the basic concepts and methods of calculation of measuring devices of control systems of aircraft. **Task:** formation in applicants of professional knowledge and practical skills on the theoretical foundations of measuring devices of motion parameters of objects, made on different physical principles, methods of mathematical description of statics and dynamics of measuring parameters of motion	ZK1 ZK2 ZK4	FC1 FC2 FC5 FC6 FC7 FC9 FC10

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			of objects; selection and substantiation of measuring parameters of objects movement; methods of extracting useful information, complexing and improving the accuracy of measurement of various parameters of technical systems, principles of construction and operation of control devices of units of aircraft control systems; methods of experimental research and testing of measuring devices		
42	**WB2.6**	**Psychology of business communication**	**Goal**: assimilation by applicants of the context of the basic psychological norms and tendencies in a modern society **Task:** formation of professional knowledge and practical skills in the historical development of psychological knowledge, the creation of conflict-free relationships in the team, personality psychology, between personal relationships and interactions, the role of leader and its impact on human consciousness, psychology of small groups and regulation of behavior and behavior, common norms of behavior and morality	ZK1 ZK4 ZK7 ZK8	FC10
43	**WB2.8.1**	**Sensors: structure and circuitry**	**Goal:** mastering by applicants of the basic concepts and methods of calculation of sensors of automation systems. **Task:** formation in applicants of professional knowledge and practical skills on the theoretical foundations of measuring devices of motion parameters of objects, made on different physical principles, methods of mathematical description of statics and dynamics of measuring parameters of motion of objects; selection and substantiation of measuring parameters of objects movement; methods of extracting useful information, complexing and improving the accuracy of measuring various parameters of technical systems, the principles of construction and operation of control devices of automation systems; methods of experimental research and testing of measuring devices	ZK1 ZK2 ZK4	FC1 FC2 FC5 FC6 FC7 FC9 FC10
VI semester					
44	**OK13.2**	**Theory of automatic control**	**Goal:**study of the basic provisions, theoretical bases of development of modern systems of automatic control; modern principles, schemes and methods of building control systems, their characteristics **Task:** acquisition by students of skills of formation of structure of system of automatic control, development of functional and	ZK1 ZK2 ZK4	FC4 FC6 FC10

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			structural schemes, construction of mathematical models of functional elements, the decision of problems of the analysis and synthesis of system, experimental research of functional properties of system		
45	**OK16.1**	**Microcontrollers in control systems**	**Goal:** mastering by applicants of the principles of internal organization of basic models of single-chip microcontrollers (MC), construction of digital controllers based on them and methodological approaches to the development of their software. **Task:** formation of applicants' professional knowledge and practical skills in the analysis of the technical task for the development of a digital controller and a reasonable choice of elements of digital microcircuitry for its implementation; principles of development and testing of software elements of digital controllers for data collection and processing and generation of control signals in real time	ZK1 ZK2 ZK4	FC2 FC3
46	**OK17.1**	**Aircraft control systems**	**Goal:** formation of applicants' knowledge and skills necessary for the development of aircraft control systems. **Task:** onproviding applicants with knowledge of the theoretical foundations, principles of construction, features of technical performance and characteristics of aircraft control systems; laws and methods of control, algorithms of functioning, typical structures and dynamic properties and characteristics of accuracy of control systems of moving objects, and also about methods of their technical realization.	ZK1 ZK2 ZK3 ZK4	FC1 FC2 FC4 FC5 FC6 FC7
47	**OK18**	**On-board networks of avionics systems**	**Goal:** mastering by applicants of the general functions and architecture of onboard computer networks, standards of their functioning, principles of data processing and technologies at the physical level and logical levels of routing and protocols **Task**: formation of applicants' professional knowledge and practical skills in the development of on-board computer networks of aircraft, application of international standards in this field, configuration and operation of network equipment, work with network services, assessment and provision of a given level of network security	ZK1 ZK2 ZK4 ZK6	FC1 FC5 FC7 FC9
48	**OK26**	**Internship**	**Goal:** mastering by applicants modern methods, forms of organization and tools in the field of development and manufacture of elements and systems of avionics.	ZK1 ZK2 ZK3	FC1 FC8 FC9

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			Task: formation of applicants, on the basis of higher education knowledge, professional skills and abilities to make independent decisions during specific work in real market and production conditions, education of the need to systematically update their knowledge and creatively apply them in practice, as well as mastering applicants working profession from among the mass specialties of the industry corresponding to the specialty of study	ZK4 ZK5 ZK7	FC10
49	**WB1.8.2**	**Information and measuring devices of avionics systems**	**Goal:** mastering by applicants of the basic concepts and methods of calculation of measuring devices of control systems of aircraft. **Task:** formation in applicants of professional knowledge and practical skills on the theoretical foundations of measuring devices of motion parameters of objects, made on different physical principles, methods of mathematical description of statics and dynamics of measuring parameters of motion of objects; selection and substantiation of measuring parameters of objects movement; methods of extracting useful information, complexing and improving the accuracy of measurement of various parameters of technical systems, principles of construction and operation of control devices of units of aircraft control systems; methods of experimental research and testing of measuring devices	ZK1 ZK2 ZK4	FC1 FC2 FC5 FC6 FC7 FC9 FC10
50	**WB1.8.3**	**Information and measuring devices of avionics systems (course project)**	**Goal:** mastering by applicants of the basic concepts and methods of calculation of measuring devices of control systems of aircraft. **Task:** formation in applicants of professional knowledge and practical skills on the theoretical foundations of measuring devices of motion parameters of objects, made on different physical principles, methods of mathematical description of statics and dynamics of measuring parameters of motion of objects; selection and substantiation of measuring parameters of objects movement; methods of extracting useful information, complexing and improving the accuracy of measurement of various parameters of technical systems, principles of construction and operation of control devices of units of	ZK1 ZK2 ZK4	FC1 FC2 FC5 FC6 FC7 FC9 FC10

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			aircraft control systems; methods of experimental research and testing of measuring devices		
51	**WB1.10**	**Aerodrome equipment**	**Goal:** Study of the aerodrome infrastructure as a single system that ensures the implementation of ICAO regulations in accordance with the creation of accident-free conditions of aircraft management and comfortable conditions for passengers	ZK1 ZK2 ZK4 ZK6	FC1 FC5 FC9
52	**WB2.8.2**	**Sensors: structure and circuitry**	**Goal:** mastering by applicants of the basic concepts and methods of calculation of sensors of systems of autoatization. **Task:** formation in applicants of professional knowledge and practical skills on the theoretical foundations of measuring devices of motion parameters of objects, made on different physical principles, methods of mathematical description of statics and dynamics of measuring parameters of motion of objects; selection and substantiation of measuring parameters of objects movement; methods of extracting useful information, complexing and improving the accuracy of measuring various parameters of technical systems, the principles of construction and operation of control devices of automation systems; methods of experimental research and testing of measuring devices	ZK1 ZK2 ZK4	FC1 FC2 FC5 FC6 FC7 FC9 FC10
53	**WB2.8.3**	**Sensors: structure and circuitry (course project)**	**Goal:** mastering by applicants of the basic concepts and methods of calculation of sensors of automation systems. **Task:** formation in applicants of professional knowledge and practical skills on the theoretical foundations of measuring devices of motion parameters of objects, made on different physical principles, methods of mathematical description of statics and dynamics of measuring parameters of motion of objects; selection and substantiation of measuring parameters of objects movement; methods of extracting useful information, complexing and improving the accuracy of measuring various parameters of technical systems, the principles of construction and operation of control devices of automation systems; methods of experimental research and testing of measuring devices	ZK1 ZK2 ZK4	FC1 FC2 FC5 FC6 FC7 FC9 FC10
54	**WB2.10**	**Building databases on Phyton**	**Goal:** Assimilation by applicants of the basic principles of building databases for embedded computer systems and programming access to them on the basis of language Phyton	ZK1 ZK2 ZK4	FC5 FC7

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			Task: formation of applicants' professional knowledge and practical skills on the theoretical foundations of building databases and databases, languages Phyton and SQL, formal database description, database development technology in integrated environments		
VII semester					
55	**OK13.3**	**Theory of automatic control (course project)**	**Goal:**study of the basic provisions, theoretical bases of development of modern systems of automatic control; modern principles, schemes and methods of building control systems, their characteristics **Task:** acquisition by students of skills of formation of structure of system of automatic control, development of functional and structural schemes, construction of mathematical models of functional elements, the decision of problems of the analysis and synthesis of system, experimental research of functional properties of system	ZK1 ZK2 ZK4	FC4 FC6 FC10
56	**OK19**	**BJD, labor protection and civil protection**	**Goal:** to form in applicants skills of observance of rules of safety and ecology in professional activity **Task:** formation of applicants' professional knowledge and practical skills in the basics of ecology, applied and theoretical aspects, analysis of environmental problems of Ukraine, the application of legislation in the field of environmental protection; structural and functional organization of man in terms of its interaction with the environment; application of methods and means of ensuring life safety	ZK1 ZK4 ZK7 ZK8	FC1 FC10
57	**OK20.1**	**Design of control systems**	**Goal:** formation of applicants' knowledge and skills necessary for the design of automatic control systems for aircraft **Task:** study of information organizational, methodical, technical, algorithmic and linguistic bases of design automatic control systems for aircraft	ZK1 ZK2 ZK3 ZK4	FC1 FC4 FC6 FC7 FC9 FC10
58	**OK21**	**Digital control systems in avionics**	**Goal:** formation of knowledge and skills required for the design of digital automatic control systems for aircraft. **Task:** formation of students' professional knowledge and practical skills in mathematical description of digital elements and avionics systems, methods of analysis of digital control systems, engineering methods of synthesis of algorithms of digital control systems of aircraft	ZK1 ZK2 ZK4	FC4 FC6

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
59	**OK16.2**	**Microcontrollers in control systems**	**Goal:** mastering by applicants of the principles of internal organization of basic models of single-chip microcontrollers (MC), construction of digital controllers based on them and methodological approaches to the development of their software. **Task:** formation of applicants' professional knowledge and practical skills in the analysis of the technical task for the development of a digital controller and a reasonable choice of elements of digital microcircuitry for its implementation; principles of development and testing of software elements of digital controllers for data collection and processing and generation of control signals in real time	ZK1 ZK2 ZK4	FC2 FC3
60	**OK17.2**	**Aircraft control systems**	**Goal:** formation of applicants' knowledge and skills necessary for the development of aircraft control systems. **Task:** onproviding applicants with knowledge of the theoretical foundations, principles of construction, features of technical performance and characteristics of aircraft control systems; laws and methods of control, algorithms of functioning, typical structures and dynamic properties and characteristics of accuracy of control systems of moving objects, and also about methods of their technical realization.	ZK1 ZK2 ZK3 ZK4	FC1 FC2 FC4 FC5 FC6 FC7
61	**WB1.9.1**	**Autonomous navigation systems**	**Goal:** mastering by applicants of the basic principles of hardware construction and algorithmic support of the autonomous navigation systems constructed on the basis platformless inertial navigation systems (BINS) **Task**: formation of applicants' professional knowledge on the theoretical foundations of BINS construction and practical skills in developing and analyzing algorithms for filtering signals and calculating navigation parameters of moving objects, complexing BINS meters, ensuring fault tolerance BINS and reconfiguration of hardware	ZK1 ZK2 ZK4	FC4 FC5 FC6 FC7 FC9 FC10
62	**WB1.11**	Fundamentals of air traffic control	**Goal:** study of technologies, methods and algorithms for solving the main functional problems of air traffic control (ATS) **Task**: study of ATS tasks, basic ICAO documents on flight maintenance, airspace organization, flight rules, separation system, air traffic control, application of radar systems for ATS, the impact of the human factor on ATS	ZK1 ZK2 ZK4 ZK6	FC1 FC9 FC10

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
63	**WB2.9**	**Development of robots and devices on the Arduino platform**	**Goal:** formation of knowledge and skills in the design of robot control systems using mobile applications and remote control based on the hardware platform Arduino **Task**: to develop in applicants skills of development and practical creation of stationary and mobile robots and other automation devices based on modules hardware Arduino platforms, skills of application of standard technologies of designing of mobile applications for realization of remote control of works	ZK1 ZK2 ZK4	FC2 FC3 FC4 FC5 FC6 FC7 FC9
64	**WB2.11**	Information protection in avionics systems	**Goal:** Assimilation by applicants of the basic principles of data protection and programming of data encryption algorithms in avionics systems, reliability analysis and noise immunity **Task**: formation of applicants' professional knowledge and practical skills on the theoretical foundations of data protection algorithms, formal description of data encryption algorithms, technical and algorithmic methods of analysis of information reliability and interference control, and their implementation and testing in integrated programming environments	ZK1 ZK2 ZK4	FC7 FC9
VIII semester					
65	**OK22**	**Economics and management of the enterprise**	**Goal:** mastering by applicants of methods of the analysis of an economic condition of the enterprise and carrying out of measures of effective management **Task**: formation of applicants for a system of professional knowledge and practical skills in the feasibility study of the design of aircraft control systems, the organization of management activities in the modern production of automation systems	ZK1 ZK2 ZK3 ZK4 ZK5 ZK7	FC4 FC9 FC10
66	**OK20.2**	**Design of control systems**	**Goal:** formation of applicants' knowledge and skills necessary for the design of automatic control systems for aircraft **Task:** study of information organizational, methodical, technical, algorithmic and linguistic bases of design automatic control systems for aircraft	ZK1 ZK2 ZK3 ZK4	FC1 FC4 FC6 FC7 FC9 FC10
67	**OK20.3**	**Design of control systems (course project)**	**Goal:** formation of applicants' knowledge and skills necessary for the design of automatic control systems for aircraft **Task:** study of information organizational, methodical, technical, algorithmic and linguistic bases of design automatic control	ZK1 ZK2 ZK3 ZK4	FC1 FC4 FC6 FC7 FC9

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			systems for aircraft		FC10
68	**OK23**	Technology of avionics systems production	**Goal:** mastering by applicants of the basic principles of development of technologies of manufacturing of elements of control systems of aircraft **Task**: to form in students a clear system of bases of theoretical knowledge, practical abilities and skills concerning application of modern technologies of production of elements of SU LA, independent modeling and research on the PC of process of realization of technologies of production of elements of SU LA, definition of the tactical and technical characteristics confirming nominal quality of products	ZK1 ZK2 ZK3 ZK4	FC1 FC8 FC9
69	**OK27**	**Thesis (project) bachelor**	**Goal:** determining the level of readiness of the applicant to solve a set of modern applied tasks in accordance with the generalized object of activity based on the application of a system of theoretical knowledge and practical skills acquired during the entire period of study in accordance with the standard of higher education. **Task:** systematization, consolidation and expansion of theoretical knowledge obtained in the educational process under the educational-professional program "Autonomous navigation systems and adaptive control of aircraft" training bachelor's degree, and their practical use in solving specific scientific, applied, engineering, economic, social and production issues in a particular field of professional activity; development of skills of independent work, mastering of methods of researches and experimentation, physical and mathematical modeling, use of modern information technologies in the course of the decision of problems which are provided by the task on diploma designing; determining the compliance of the level of training of the graduate with the requirements of the educational characteristics of the specialist,	ZK1 ZK2 ZK3 ZK4 ZK5 ZK6 ZK7 ZK8	FC1 FC2 FC3 FC4 FC5 FC6 FC7 FC8 FC9 FC10
70	**WB1.9.2**	**Autonomous navigation systems**	**Goal:** mastering by applicants of the basic principles of hardware construction and algorithmic support of the autonomous navigation systems constructed on the basis platformless inertial navigation systems (BINS) **Task**: formation of applicants' professional knowledge on the theoretical foundations of BINS construction and practical skills in	ZK1 ZK2 ZK4	FC4 FC5 FC6 FC7 FC9 FC10

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			developing and analyzing algorithms for filtering signals and calculating navigation parameters of moving objects, complexing BINS meters, ensuring fault tolerance BINS and reconfiguration of hardware		
71	**WB1.12**	**Automation of avionics systems design**	**Goal:** acquisition by applicants of knowledge about approaches to the construction and application of software and hardware automation systems for the design of avionics systems. **Task**: formation of a clear system of theoretical knowledge, practical skills and abilities regarding the approach to the construction process, application of various classes of technical means of automation, basic algorithms for solving problems of optimization of automation systems SU LA, optimal management for conscious, qualified and creative use of this knowledge in production, mathematical formulation and research with the help of PC systems for automation of avionics systems design.	ZK1 ZK2 ZK3 ZK4	FC4 FC7
72	**WB2.13**	**Geoinformation technologies in avionics**	**Goal:** assimilation by applicants of the basic technologies application of elements dinformation systems (GIS) in avionics systems **Task**: formation of applicants' professional knowledge on the theoretical foundations of GIS construction and practical skills in the application of GIS technologies in the development of algorithmic and software for avionics systems	ZK1 ZK2 ZK3 ZK4	FC5 FC7 FC9 FC10
73	**WB2.12**	**Automation of information and control processes**	**Goal:** basic approaches to building automation systems for information and control processes. Features of construction of systems of automation of information and control processes. Methods for optimizing the structure of automation systems of information and control processes. **Task**: formation of a clear system of theoretical knowledge, practical skills and abilities regarding the approach to the construction process, application of various classes of technical means of automation, basic algorithms for solving problems of automation of information and control processes, optimal management for conscious, qualified and creative use of this knowledge , mathematical formulation and research with the help of PC models of organization and operation of automation	ZK1 ZK2 ZK3 ZK4	FC4 FC7

№ for / n	Code COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			systems of information and control processes.		

4 HIGHER EDUCATION CERTIFICATION FORM

Certification of the graduate according to the educational-professional program "Autonomous navigation systems and adaptive control of aircraft" in the specialty 173 "Avionics" is carried out in the form of public defense of a bachelor's thesis (project). In case of successful defense, he is awarded a bachelor's degree with the qualification: Bachelor of Avionics in the educational and professional program "Autonomous Navigation Systems and Adaptive Control of Aircraft".

Certification is carried out openly and publicly.

5 MATRIX OF CONFORMITY OF SOFTWARE COMPETENCIES TO THE COMPONENTS OF THE EDUCATIONAL PROFESSIONAL PROGRAM

Program competencies	Components of the educational program																									
	OK1	OK2	OK3	OK4	OK5	OK6	OK7	OK8	OK9	OK10	OK11	OK12	OK13	OK14	OK15	OK16	OK17	OK18	OK19	OK20	OK21	OK22	OK23	OK24	OK25	OK26	OK27
ZK1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ZK2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+
ZK3							+										+			+		+	+			+	+
ZK4		+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ZK5																						+		+	+	+	+
ZK6																		+									+
ZK7																			+			+				+	+
ZK8																			+								+
FC1					+						+						+	+	+	+		+	+	+	+	+	+
FC2								+	+	+						+	+										+
FC3																+											+
FC4					+							+	+		+		+			+	+	+					+
FC5			+	+										+			+	+									+
FC6	+	+	+			+	+	+	+	+	+	+	+	+	+		+			+	+						+
FC7				+			+										+	+		+							+
FC8																							+			+	+
FC9						+									+			+		+		+	+		+	+	+
FC10							+				+		+						+	+		+		+	+	+	+

End of table

MATRIX OF CONFORMITY OF SOFTWARE COMPETENCIES TO THE COMPONENTS OF THE EDUCATIONAL PROFESSIONAL PROGRAM

Program competencies	Components of the educational program																							
	WB1.1	WB1.2	WB1.3	WB1.4	WB1.5	WB1.6	WB1.7	WB1.8	WB1.9	WB1.10	WB1.11	WB1.12	WB2.1	WB2.2	WB2.3	WB2.4	WB2.5	WB2.6	WB2.7	WB2.8	WB2.9	WB2.10	WB2.11	WB2.12	WB2.13
ZK1	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ZK2			+	+	+		+	+	+	+	+	+			+	+	+		+	+	+	+	+	+	+
ZK3												+												+	+
ZK4					+	+	+	+	+	+	+	+						+		+	+	+	+	+	+
ZK5		+	+	+	+									+	+	+	+		+						
ZK6	+									+	+		+												
ZK7			+			+									+			+							
ZK8				+	+	+										+	+	+							
FC1	+	+	+	+	+	+		+		+	+		+	+	+	+	+	+		+					
FC2								+												+	+				
FC3																					+				
FC4									+			+									+			+	
FC5								+	+	+										+	+	+			+
FC6							+	+	+										+	+	+				
FC7								+	+			+								+	+	+	+	+	+
FC8																									
FC9								+	+	+	+									+	+		+		+
FC10	+	+	+		+	+		+	+		+		+	+	+		+	+		+					+

6 MATRIX OF CONFORMITY OF SOFTWARE LEARNING RESULTS (PRN) TO THE RELEVANT COMPONENTS OF THE EDUCATIONAL PROFESSIONAL PROGRAM

Program learning outcomes	Components of the educational program																									
	OK1	OK2	OK3	OK4	OK5	OK6	OK7	OK8	OK9	OK10	OK11	OK12	OK13	OK14	OK15	OK16	OK17	OK18	OK19	OK20	OK21	OK22	OK23	OK24	OK25	OK26	OK27
PRN 1			+	+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PRN 2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PRN 3							+						+			+	+			+	+	+	+		+	+	+
PRN 4					+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PRN 5					+		+				+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+
PRN 6	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PRN 7																		+	+			+		+	+	+	+
PRN 8																						+					+
PRN 9																											+
PRN 10																			+								+
PRN 11						+					+	+	+		+		+			+	+	+			+	+	+
PRN 12								+	+	+						+											+
PRN 13																+											+
PRN 14			+		+		+				+	+	+	+	+		+			+	+						+
PRN 15												+	+		+		+			+	+						+
PRN 16			+	+										+			+	+		+							+
PRN 17				+						+							+	+									+
PRN 18																	+						+			+	+
PRN 19															+		+	+		+		+	+		+	+	+

Continuation of Table
MATRIX OF CONFORMITY OF PROGRAM LEARNING RESULTS (PRN) TO THE COMPONENTS OF THE EDUCATIONAL PROFESSIONAL PROGRAM

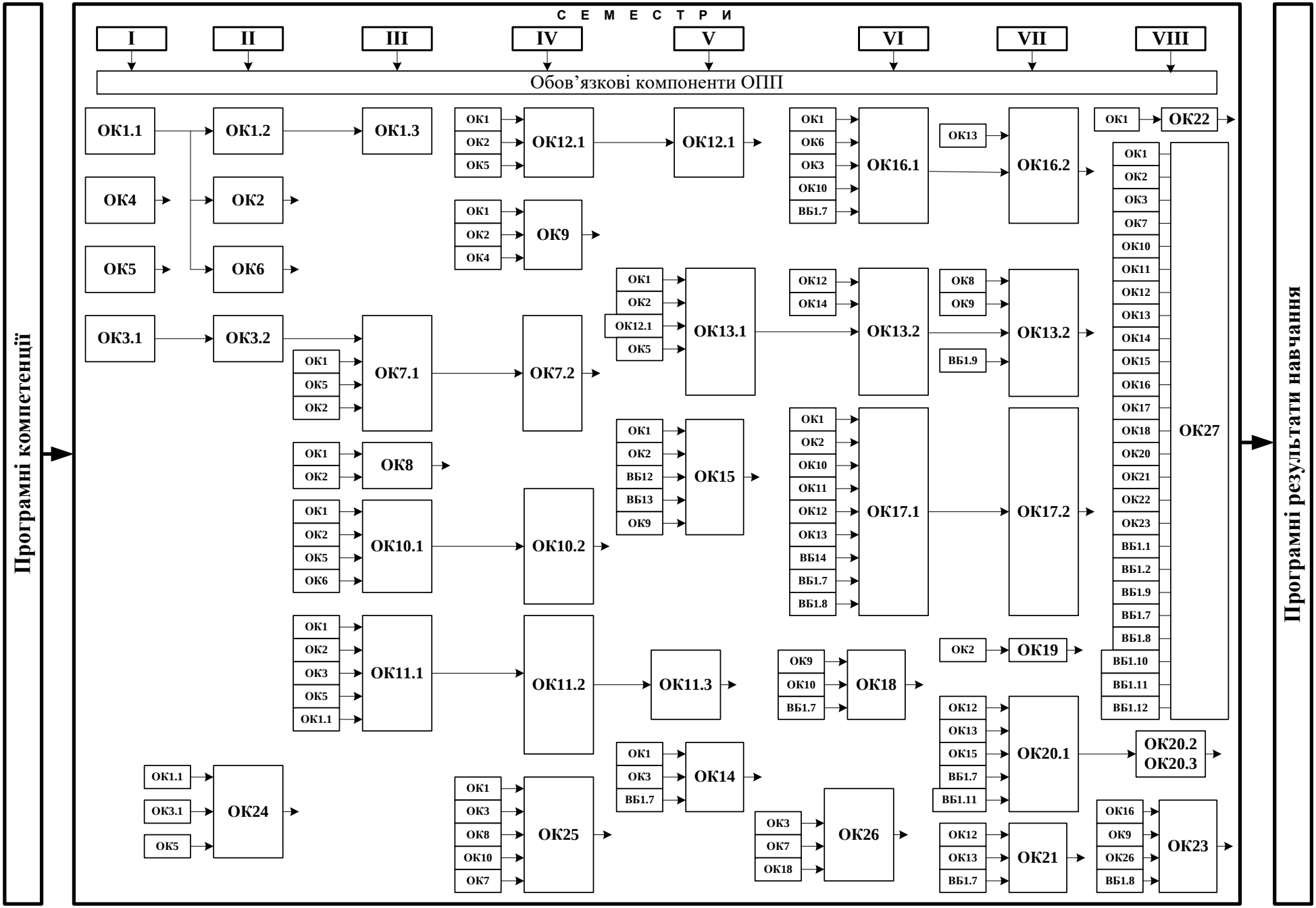
	Components of the educational program											
Program learning outcomes	WB1.1	WB1.2	WB1.3	WB1.4	WB1.5	WB1.6	WB1.7	WB1.8	WB1.9	WB1.10	WB1.11	WB1.12
PRN 1	+						+	+	+	+	+	+
PRN 2	+	+	+	+	+	+	+	+	+	+	+	+
PRN 3								+	+			+
PRN 4				+	+	+	+	+	+	+	+	+
PRN 5				+	+	+		+	+	+	+	+
PRN 6				+	+	+	+	+	+	+	+	+
PRN 7	+	+	+	+	+	+				+	+	
PRN 8			+									
PRN 9				+	+	+						
PRN 10				+		+						
PRN 11								+	+			+
PRN 12								+				
PRN 13												
PRN 14								+	+			+
PRN 15							+	+	+			+
PRN 16	+	+						+	+	+	+	
PRN 17									+			+
PRN 18												
PRN 19								+	+	+	+	

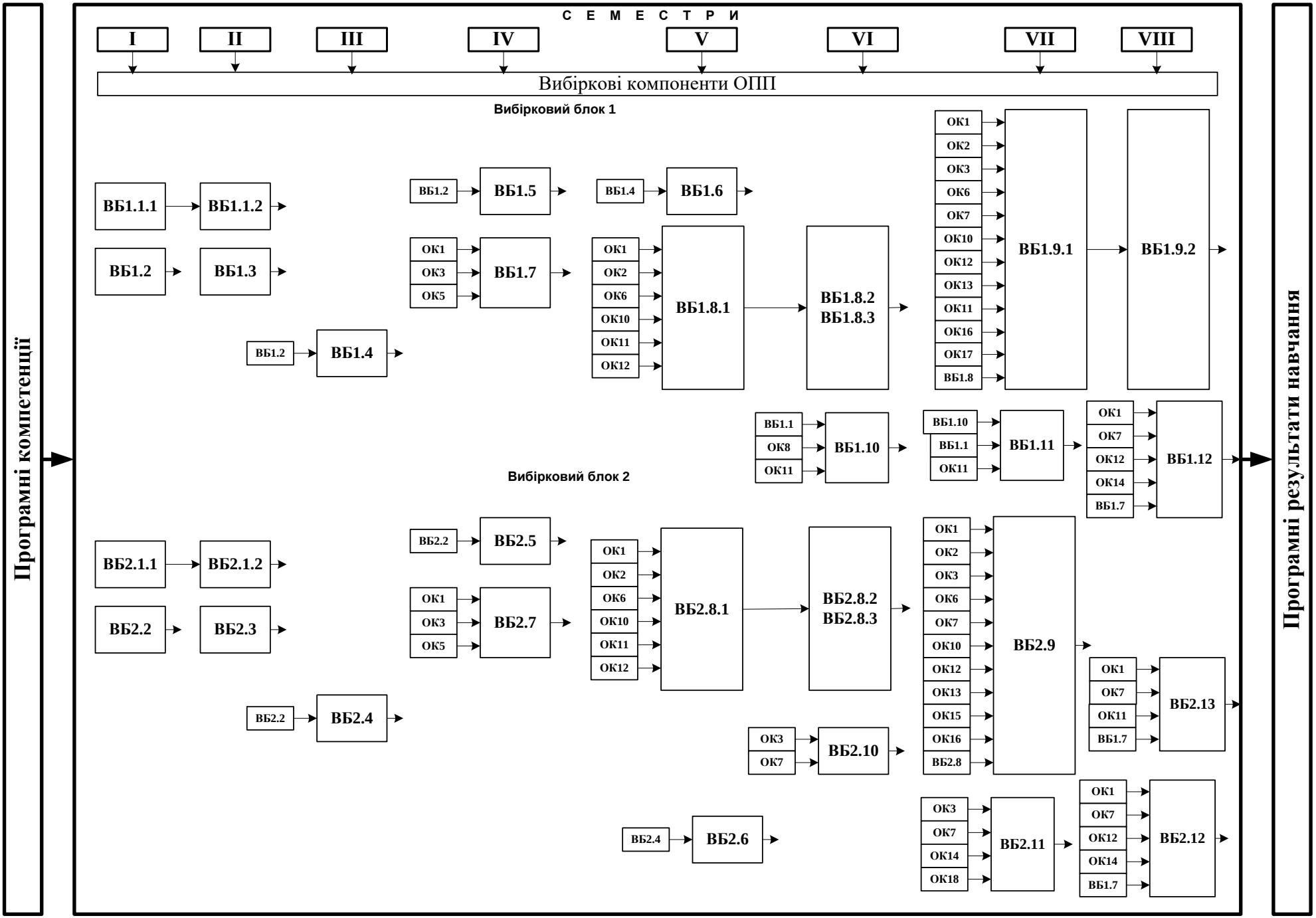
End of table

MATRIX OF CONFORMITY OF PROGRAM LEARNING RESULTS (PRN) TO THE COMPONENTS OF THE EDUCATIONAL PROFESSIONAL PROGRAM

	Components of the educational program												
Program results teaching	WB2.1	WB2.2	WB2.3	WB2.4	WB2.5	WB2.6	WB2.7	WB2.8	WB2.9	WB2.10	WB2.11	WB2.12	WB2.13
PRN 1							+	+	+	+	+	+	+
PRN 2	+	+	+	+	+	+	+	+	+	+	+	+	+
PRN 3								+	+		+	+	+
PRN 4				+	+	+	+	+	+	+	+	+	+
PRN 5				+	+	+		+	+	+	+	+	+
PRN 6				+	+	+	+	+	+	+	+	+	+
PRN 7	+	+	+	+	+	+							
PRN 8			+										
PRN 9				+	+	+							
PRN 10				+		+							
PRN 11								+	+			+	
PRN 12								+	+				
PRN 13									+				
PRN 14								+	+	+	+	+	
PRN 15							+	+	+			+	
PRN 16	+	+						+	+	+			+
PRN 17									+		+	+	+
PRN 18													
PRN 19								+	+		+		+

Appendix A
STRUCTURAL AND LOGICAL SCHEME OF THE EDUCATIONAL PROFESSIONAL PROGRAM




Програмні компетенції
С Е М Е С Т Р И
I
II
III
IV
V
VI
VII
VIII
Вибіркові компоненти ОПП
Вибірковий блок 1
ВБ1.1.1
ВБ1.1.2
ВБ1.2
ВБ1.3
ВБ1.2
ВБ1.4
ВБ1.2
ВБ1.5
ВБ1.4
ВБ1.6
ОК1
ОК3
ОК5
ВБ1.7
ОК1
ОК2
ОК6
ОК10
ОК11
ОК12
ВБ1.8.1
ВБ1.8.2
ВБ1.8.3
ОК1
ОК2
ОК3
ОК6
ОК7
ОК10
ОК12
ОК13
ОК11
ОК16
ОК17
ВБ1.8
ВБ1.9.1
ВБ1.9.2
ВБ1.1
ОК8
ОК11
ВБ1.10
ВБ1.10
ВБ1.1
ОК11
ВБ1.11
ОК1
ОК7
ОК12
ОК14
ВБ1.7
ВБ1.12
Вибірковий блок 2
ВБ2.1.1
ВБ2.1.2
ВБ2.2
ВБ2.3
ВБ2.2
ВБ2.4
ВБ2.2
ВБ2.5
ОК1
ОК3
ОК5
ВБ2.7
ОК1
ОК2
ОК6
ОК10
ОК11
ОК12
ВБ2.8.1
ВБ2.8.2
ВБ2.8.3
ОК1
ОК2
ОК3
ОК6
ОК7
ОК10
ОК12
ОК13
ОК15
ОК16
ВБ2.8
ВБ2.9
ОК3
ОК7
ВБ2.10
ОК1
ОК7
ОК11
ВБ1.7
ВБ2.13
ВБ2.4
ВБ2.6
ОК3
ОК7
ОК14
ОК18
ВБ2.11
ОК1
ОК7
ОК12
ОК14
ВБ1.7
ВБ2.12
Програмні результати навчання