

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

**Національний аерокосмічний університет ім. М.Є. Жуковського
«Харківський авіаційний інститут»**

ЗАТВЕРДЖЕНО

вченою радою
Національного аерокосмічного
університету ім. М.Є. Жуковського
«Харківський авіаційний інститут»
19 квітня 2017 р., протокол № 13

ОСВІТНЬО-НАУКОВА ПРОГРАМА

Літаки і вертольоти

Рівень вищої освіти – другий (магістерський)

за спеціальністю 134 Авіаційна та ракетно-космічна техніка

галузі знань 13 Механічна інженерія

**Кваліфікація: магістр з авіаційної та ракетно-космічної техніки за
освітньою програмою «Літаки і вертольоти»**

Освітня програма вводиться в дію
з «01» вересня 2017 р.

Проректор з ННР Національного
аерокосмічного університету
ім. М.Є. Жуковського
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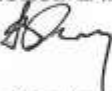
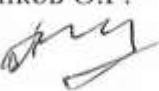



Харків 2017 р.



ПЕРЕДМОВА

Освітня програма «Літаки і вертольоти» за спеціальністю 134 "Авіаційна та ракетно-космічна техніка" для підготовки магістрів розроблено робочою групою Національного аерокосмічного університету ім. М. С. Жуковського «Харківський авіаційний інститут» у складі:

а) проектна група:

- | | | | |
|---|---------------------------|--|---|
| 1 | Гарант освітньої програми | Рябков В.І.
 | – д-р техн. наук, професор, кафедра проектування літаків та вертольотів |
| 2 | Члени проектної групи: | Гребеніков О.Г.
 | – д-р техн. наук, професор, кафедра проектування літаків та вертольотів |
| 3 | | Гуменний А.М.
 | – канд. техн. наук, доц., кафедра проектування літаків та вертольотів |

б) члени робочої групи:

- | | | | |
|---|-------------|---|---|
| 1 | Чумак А.С. |  | – старший викладач, кафедра проектування літаків та вертольотів |
| 2 | Мамина О.В. |  | – секретар, кафедра проектування літаків та вертольотів |
| 3 | | | |

Рецензії-відгуки зовнішніх стейкхолдерів (за наявності):

- 1
- 2
- 3

Ця освітня програма не може бути повністю або частково відтворена, тиражована та розповсюджена без дозволу Національного аерокосмічного університету ім. М.С. Жуковського «Харківський авіаційний інститут»

INTRODUCTION

In accordance with 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 to implement this program, as well as the expected learning outcomes (competencies) that must be mastered by the applicant.

The educational program is used during:

- 2 accreditation of the educational program, inspection of educational activity by specialty and specialization;
- 3 curriculum development, curricula and practices;
- 4 development of diagnostic tools for the quality of higher education;
- 5 determining the content of training in the system of retraining and advanced training;
- 6 professional orientation of applicants for the specialty.

The educational 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: the

- 7 scope and duration of training of masters;
- 8 general competencies;
- 9 professional competencies;
- 10 program learning outcomes;
- 11 the list and volume of academic disciplines for mastering the competencies of the educational and scientific program;
- 12 requirements for the structure of academic disciplines.

The educational and scientific program is used for:

- 13 drawing up of curricula and working curricula;
- 14 formation of individual plans of students;
- 15 formation of working programs of academic disciplines, practices;
- 16 determination of the information base for the formation of diagnostic tools;
- 17 accreditation of educational and scientific program;
- 18 internal and external quality control of training;
- 19 certification of masters in the educational and scientific program "Airplanes and helicopters" in the specialty 134 "Aviation and rocket and space technology".

Beneficiaries of the educational program:

- 20 applicants for higher education who study at the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute";
- 21 scientific and pedagogical workers who train masters in the educational and scientific program "Airplanes and helicopters" in the specialty 134 "Aviation and

rocket and space technology".

22 examination commission of specialty 134 "Aviation and rocket and space technology";

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

24 The educational program extends to the departments of the University, involved in the training of specialists with a master's degree in the educational and scientific program "Aircraft and Helicopters" in the specialty 134 "Aviation and Rocket and Space Engineering".

1 REGULATORY REFERENCES

The educational program is developed on the basis of the following normative documents 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 for which higher education is conducted" dated 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 higher education standards, approved by the higher education sector of the Scientific and Methodological Council of the Ministry of Education and Science of Ukraine Minutes of 29.03.2016 № 3

1.7 Regulations "On the organization of the educational process" them. 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 dated 23.11.2011 № 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 fields of knowledge and specialties for which higher education is 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 extra. / Author: VM Захарченко, С.А. Kalashnikov, VI Луговий, А.В. Stavvtsky, Yu.M. Рашкевич, Ж.В. Talanova / Ed .. V.G. Flint. - Kyiv: Pleiades Publishing House LLC, 2014. - 100 p.

1.16 Draft Standard of Higher Education for Master's Degree in Specialty 272 Aviation Transport / 2017. - 28 p.

2 Profile of the educational program "Airplanes and helicopters" in the specialty 134 "Aviation and rocket and space technology".

1 - General information	
Full name of the higher educational institution and structural subdivision	National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" Department of Aircraft and Helicopter Design
Degree of higher education and title of qualification in the original language	Degree of higher education - second (master's) Qualification: Master of Aviation and Rocket and Space Engineering in the educational program "Aircraft and Helicopters" Qualification : Master in Airplanes and Helicopters
Official name of the educational program	Airplanes and Helicopters Aircraft and Helicopters
Type of diploma and scope of the educational-scientific program	Master's degree, single, 120 ECTS credits, term of study 1 year 9 months
Accreditation	certificate: Series IV Sun-Sun 2172035, dated September 2, 2014. Accreditation period: 10 years (Re-accreditation in 2014)
Cycle / level of	NRC of Ukraine: master - level 7
Prerequisites	Presence of a bachelor's degree
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. of the relevant discipline in the state language. At the request of higher education students, the higher education institution creates opportunities for them to learn the language of a national minority to the extent that allows them to carry out professional activities in the chosen field using this language.
The term of the educational and scientific program is	five years.
Internet address of the permanent placement of	http://k103.khai.edu

the description of the educational-scientific program	
<u>2 - Purpose of the educational program</u>	
Training of the experts possessing deep knowledge, and also basic and professional competences and capable to correct independent statement and the decision of problems of scientific-practical and research activities in the field of aircraft and helicopter design	
<u>3 - Characteristics of the educational and scientific program</u>	
Subject area (field of knowledge, specialty, specialization)	Fields of knowledge 13 "Mechanical Engineering" Specialty 134 "Aerospace and aeronautics" Aircraft and helicopters
Orientation lighting - scientific program	Educational-scientific
The main focus of the educational-scientific program (specialization)	Educational-scientific program sets qualification requirements for social and production activities of graduates of higher education in the specialty 134 "Aviation and rocket and space technology" educational degree "Master" and state requirements to the properties and qualities of the person who gets La certain educational level appropriate professional direction in educational and scientific program "Airplanes and helicopters"
<u>Features</u>	Practical training is conducted in the aviation sector
<u>4 - Suitability graduates for employment and further education</u>	
<u>suitability for employment</u>	Graduates can work in accordance with the National Classifier of Ukraine (Classification of occupations DK: 003: 2010): 22211.1 design engineer; 22209.1 research engineer; 2149.2 aviation engineer in the fields of economics
<u>Further education</u>	A person has the right to continue education at the third (educational and scientific) level to obtain the degree of Doctor of Philosophy
<u>5 - Teaching and assessment</u>	
<u>Teaching and learning</u>	Student-centered learning, self-study, problem-oriented learning aimed at development critical and creative thinking, learning through laboratory practice, dual, distance education, etc. Lectures, multimedia lectures, laboratory work, seminars, practical classes in groups, independent work based on textbooks and abstracts, consultations with teachers, preparation of master's thesis project
<u>Assessment</u>	Written exams and tests, course projects and works, reports on practices, presentations, current (modular) control, master's thesis project and its defense
<u>6 - Program competencies</u>	
<u>Integral competence</u>	The ability to solve complex problems and problems in the design, manufacture and operation of aircraft or in the learning process, which involves research and / or innovation and is characterized by uncertainty conditions and requirements
<u>General competencies (LC)</u>	LC1 - the ability to identify the scientific essence and solve problems in the professional sphere, to find adequate ways to solve them. ZK2 - the ability to abstract thinking, analysis and synthesis in the

	<p>design of aircraft and helicopters.</p> <p>LC3 - the ability to identify, pose and solve problems.</p> <p>LC4 - the ability to conduct research to solve complex problems in professional activities.</p> <p>LC5 - the ability to generate new ideas (creativity), identify, pose and solve problems, find optimal ways to solve them, including working in a team with representatives of other professional groups.</p> <p>ZK6 - skills of using information and communication technologies.</p> <p>ZK7 - the ability to investigate problems using systems analysis, synthesis, computer modeling and optimization methods.</p> <p>LC8 - the ability to adapt and act in a new situation.</p> <p>LC9 - the ability to analyze, verify, assess the completeness of information in the course of professional activity, if necessary, to supplement and synthesize missing information and work in conditions of uncertainty.</p> <p>LC10 - the ability to further autonomous and independent learning based on the latest scientific and technical achievements.</p> <p>LC11 - the ability to communicate in a foreign language in professional activities.</p> <p>LC12 - the ability to conduct professional, including research, in an international environment.</p>
<p><u>Professional competencies of the specialty (FC)</u></p>	<p>FC1 - Ability to formulate the purpose and objectives of the study, identify priorities for solving problems, select and create evaluation criteria</p> <p>FC2 - Ability to apply modern research methods, evaluate and present the results of work</p> <p>FC3 - Ability to have a full set of legal and regulatory acts in the field of aviation safety related to the object of professional activity</p> <p>FC4 - Knowledge and ability to use the achievements of science and technology in professional activity</p> <p>FC5 - Ability to prepare reviews, publications based on research</p> <p>FC6 - Ability to prepare, plan and conduct training sessions in educational organizations</p> <p>FC7 - Ability to organize the work of teams of performers to achieve the goal, to make and implement management decisions in a range of opinions, to determine the order of work on the design of production and testing of aircraft.</p> <p>FC8 - Ability to apply mathematical theory of organization and planning of the experiment, to develop research plans, to choose algorithms for processing measurement information, as well as to use the necessary software to automate calculations.</p> <p>FC9 - Ability to develop production programs for maintenance, service, repair and other services in the operation of aircraft on the basis of deep fundamental and special knowledge.</p> <p>FC10 - Awareness in the field of aerohydrodynamics, basic knowledge to describe the interaction of bodies with the air and hydraulic environment.</p> <p>FC11 - Ability to apply basic knowledge in the field of mathematics for mathematical modeling of phenomena and objects in professional activities in the specialty.</p> <p>FC12 - Knowledge of the basics of setting and solving problems of designing parameters of products and processes.</p>

	<p>FC13 - Awareness in the field of kinematic and force interaction of elements of systems of material objects within the specialty.</p> <p>FK14 - Basic knowledge in the field of numerical methods for solving algebraic and differential equations and their systems, finding extremums of functions with constraint, determining the stress-strain state of aircraft and helicopter structures.</p> <p>FC15 - Ability to develop design, organizational, technical and regulatory documentation for the design of production and testing of aircraft.</p>
<u>7 - Program learning</u>	
	<p>outcomes PRN1 - Formulate the purpose and objectives of the study, identify priorities for solving problems, select and create evaluation criteria.</p> <p>PRN2 - Apply modern research methods, evaluate and present the results of work performed.</p> <p>PRN3 - Use the laws and methods of mathematics, natural sciences, humanities and economics in solving professional problems, including the solution of non-standard problems that require in-depth analysis of their essence from a natural science standpoint.</p> <p>PRN4 - Improve professional activities, decision-making methodology and developments in the direction of improving aviation safety.</p> <p>PRN5 - Have a full set of legal and regulatory acts in the field of aviation safety related to the object of professional activity.</p> <p>PRN6 - Use the achievements of science and technology in professional activities.</p> <p>PRN7 - Prepare reviews, publications based on the results of research.</p> <p>PRN8 - Perform a patent search and prepare materials for applications for intellectual property documents.</p> <p>PRN9 - Prepare, plan and conduct training sessions in educational organizations.</p> <p>PRN10 - To organize the work of teams of performers in order to achieve this goal, to adopt and implement management decisions in a range of opinions, to determine the order of work on the design of production and testing of aircraft.</p> <p>PRN11 - Apply mathematical theory of organization and planning of the experiment, develop research plans, choose algorithms for processing measurement information, as well as use the necessary software to automate calculations.</p> <p>PRN12 - To develop production programs for maintenance, service, repair and other services in the operation of aircraft on the basis of deep fundamental and special knowledge.</p> <p>PRN13 - Apply basic knowledge in the field of aerohydrodynamics, basic knowledge to describe the interaction of bodies with air and hydraulic environment.</p> <p>PRN14 - Apply basic knowledge in the field of mathematics for mathematical modeling of phenomena and objects in professional activities in the specialty.</p> <p>PRN15 - Apply basic knowledge of the basics of setting and solving problems of designing parameters of products and processes.</p> <p>PRN16 - Apply basic knowledge of kinematic and force interaction of elements of systems of material objects within the specialty.</p> <p>PRN17 - Apply basic knowledge in the field of numerical methods for</p>

	<p>solving algebraic and differential equations and their systems, search for extremums of functions with constraint, determination of stress-strain state of aircraft and helicopter structures.</p> <p>PRN18 - To develop design, organizational, technical and regulatory and methodological documentation for the design of production and testing of aircraft.</p>
8 - Source of the program	
<u>Staffing</u>	Research and teaching staff, providing educational and professional qualifications for the program, meet the profile and direction of subjects taught have the required experience teaching and practical experience, have degrees and / or rank meet the licensing requirements
<u>Material and technical support</u>	The educational process takes place in lecture halls, classrooms and laboratories equipped with public projection and media equipment, computers and the necessary specialized laboratory equipment. Logistics allows to fully ensure the educational process throughout the training cycle of the educational-professional program. The condition of the premises is certified by sanitary and technical passports that comply with existing regulations.
<u>Information and educational and methodological support</u>	Fund of the Scientific and Technical Library of the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" contains a complete information support of all educational components of the educational and scientific program "Maintenance and repair of aircraft and aircraft engines", both on traditional media and audio, video, CD, DVD disks, network electronic documents. The educational process is provided by educational and methodical complexes of disciplines both in printed form and in electronic form.
9 - Academic mobility	
National credit mobility	On the basis of bilateral agreements between the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" and domestic higher education institutions-partners and enterprises of the aviation industry in Ukraine
International credit mobility	On the basis of bilateral agreements between the National Aerospace University. Zhukovsky "Kharkiv Aviation Institute" and universities partners abroad
Study foreign competitors of Higher Education	Teaching foreigners made public or English

3 List component education and research programs and their logical sequence

3.1 List component OP

code CPC	educational components programs (academic disciplines, course projects (works), practices, qualifying work)	Number of credits	Form of final control
1	2	3	4
Mandatory components OP			
OK1	Intellectual property	4	credit
OK2	History of science and technology	4	credit
OK3	Research work	15	exam
OK4	Psychology and pedagogy of high school	4	credit
OK5	Technology of aircraft production	4.5	exam
OK6	Technology of aircraft production	2	diff. credit

OK7	Undergraduate practice	10	. credit
OK8	degree design	27.5	protection qualification of master of
total mandatory components:		71	
components SelectiveOP			
<i>Selectiveunit 1</i>			
VB1.1	overall design of aircraft and helicopters	8	Exam
VB1.2	Simulation aviation engineering facilities with the help of SIEMENS NX	4	exam
WB1.3	Engineering analysis of aircraft elements	8	exam
WB1.4	Integrated design of aircraft and helicopters	12.5	exam
WB1.5	Efficiency and reliability of aircraft	4.5	exam
WB1.6	Certification of aircraft and helicopters	4	credit
WB1.7	Aviation technical translation	4	test
WB1.8	Special sections of mathematics and mechanics	4	exam
<i>Selective unit 2</i>			
WB2.1	Design of aircraft units	8	exam
WB2.2	International and state regulation of airworthiness of aircraft	4	test
WB2.3	Design of aircraft units	8	test
WB2.4	Constructions Helicopters	12.5	Exam
WB2.5	Maintenance of Aircraft and Aircraft Engines	4.5	Exam
WB2.6	Functionalaircraft system	4	test
VB2.7	system diagnostics and condition monitoring of aircraft and aircraft engines	4	exam
VB2.8	safety and aviation security	4	test
The total volume of sample component:		49	
Total volume of educational programs		120	

3.2 Structural and logic circuit OP

Structural-logical the scheme of the educational program reflects the sequence of studying its components and is given in Annex A (scheme). The scheme contains mandatory components and components of sample block 1, because this block for this educational program is the basic (priority). If another sample unit is selected as the applicant for higher education, the individual trajectory of study is determined and an individual plan is drawn up.

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

№ for / n	Code KOP	Name of the component OP	Purpose and objectives of the component OP	Formation of competencies	
				general	profes sional
I semester					

1	OK1	Intellectual property	<p>Purpose: deep mastering of knowledge on legal regulation of relations origin, use and protection of intellectual property rights.</p> <p>Objectives: formation of students' professional knowledge on the general provisions of intellectual property law, its institutions, concepts and types of objects and subjects of intellectual property law, the grounds, conditions and procedure for using its results, the procedure and methods of protection of infringed rights.</p>	ZK1 ZK2 ZK4 ZK5 ZK8 ZK10	FK5
3	VB1.1	General design of airplanes and helicopters	<p>Purpose: acquisition of knowledge about the methodology of general design of airplanes and helicopters. Gain the necessary skills in the field of general design of aircraft and helicopters and master the methods of forming tactical and technical requirements for aircraft and helicopters, the concept of creating new efficient aircraft and helicopters, analytical methods for determining the parameters of aircraft and helicopters in automated design; Methods for determining the characteristics of engines and their application</p> <p>Objectives: to gain knowledge of modern methods of design, construction and modeling of aircraft and helicopters, Standards of airworthiness of aircraft and helicopters, certification of aircraft, basic requirements for "Standard Specification" for aircraft and technical guidance maintenance and operation.</p>	ZK1 ZK2 ZK4 ZK5 ZK8 ZK10	FK5
4	OK5	Technology of aircraft production	<p>Purpose: to provide knowledge about the system approach in the design of modern technology for assembling aircraft and helicopters in the aviation industry; about a technique of designing of technical processes of assembly of standard designs of units, sections, compartments and knots on the technical conditions provided in advance. About structure of directive technologies at the aircraft-building enterprise; on technological directions of ensuring reliability and resources in the field of assembly production. To teach to carry out technological and organizational training at the airline. Conduct a sound analysis of the design for manufacturability; to design schemes of</p>	3K1 3K2 3K4 3K5 3K7 3K8 3K9 3K10	ΦK1 ΦK2 ΦK3 ΦK4 ΦK5 ΦK11 ΦK12

			<p>assembly and binding of equipment; competently choose standard equipment for technical processes. Know the method of designing assembly equipment, cycle schedules of current production. Providing the ability to perform calculations on the accuracy of assembly.</p> <p>Tasks: to teach to carry out technological and organizational training at the airline; to conduct a reasonable analysis of the design for manufacturability; to design schemes of assembly and binding of equipment; competently choose standard equipment for technical processes.</p>		
5	ББ1.2	Modeling of aviation equipment objects by means of SIEMENS NX system	<p>Purpose: acquisition by students of knowledge of modern methods of designing, designing and modeling of objects of aerospace aircraft and helicopters, their units and systems, equipment, assemblies, the creation of master geometry, space distribution models and analytical design standards using computer integrated systems and skills in the Siemens NX system. The student must master to obtain modern methods of integrated design and modeling of aircraft units using computer integrated systems.</p> <p>Objective: to provide students with knowledge of modern methods of design, construction and modeling of aircraft and helicopters using computer integrated CAD / CAM / CAE systems, including Siemens NX.</p>	ZK1 ZK2 ZK4 ZK5 ZK8 ZK10	FK5
II semester					
6	OK3	Research work	<p>Purpose: to give knowledge in the field of organization of research and inventive activity, to teach methods of preparation, carrying out experimental researches, processing of results of experiments and registration of the scientific report on results of researches.</p> <p>Task: mastering the methods of theoretical, experimental research in the aviation industry.</p>	3K1 3K2 3K3 3K4 3K5 3K6 3K7 3K8 3K10	ΦK2 ΦK3 ΦK4 ΦK5 ΦK9 ΦK11 ΦK13 ΦK14 ΦK15
7	OK6	Technology of aviation	<p>Purpose: to provide knowledge about the system approach at designing of modern technology of assembly of planes and</p>	ZK1 ZK2	FK1 FK2

		equipment production	helicopters in aviation; about a technique of designing of technical processes of assembly of standard designs of units, sections, compartments and knots on the technical conditions provided in advance. About structure of directive technologies at the aircraft-building enterprise; on technological directions of ensuring reliability and resources in the field of assembly production. To teach to carry out technological and organizational training at the airline. Conduct a sound analysis of the design for manufacturability; to design schemes of assembly and binding of equipment; competently choose standard equipment for technical processes. Know the method of designing assembly equipment, cycle schedules of current production. Providing the ability to perform calculations on the accuracy of assembly. Tasks: to teach to carry out technological and organizational training at the airline; to conduct a reasonable analysis of the design for manufacturability; to design schemes of assembly and binding of equipment; competently choose standard equipment for technical processes.	ZK4 ZK5 ZK7 ZK8 ZK9 ZK10	FK3 FK4 FK5 FK11 FK12
8	OK2	History of Science and Technology	Objective: To form students scientific basis, theoretical and practical knowledge on design and construction of basic units aeronautical engineering from the conditions minimize their weight and compliance with regulations flight capacity of helicopters in terms of strength, rigidity and service life of their structures. Objectives: to give students knowledge: about the types, nature of the operational loads of aircraft and features of their definition; about functional work of units; about features of interaction of units and knots at operational and settlement loadings; about modern techniques of designing and designing of units from a condition of a minimum of weight and taking into account the set resource; about the main stages and the maintenance of designing of units; about methods of selection of parameters and constructive-power schemes of units	3K1 3K2 3K4 3K5 3K7 3K8 3K9 3K10	ΦK1 ΦK2 ΦK3 ΦK4 ΦK5 ΦK11 ΦK12
9	BB1.8	Special sections of	Purpose: to form students' scientific	ZK1	FK1

		mathematics and mechanics	base, theoretical and theoretical knowledge basic units of aircraft from the conditions of the minimum of their weight and observance of requirements of norms of flying ability of helicopters on durability, rigidity and a resource of their designs. Objectives: to give students knowledge: about the types, nature of the operational loads of aircraft and features of their definition; about functional work of units; about features of interaction of units and knots at operational and settlement loadings; about modern techniques of designing and designing of units from a condition of a minimum of weight and taking into account the set resource; about the main stages and the maintenance of designing of units; methods for selecting parameters and design-security schemes units	ZK2 ZK4 ZK5 ZK7 ZK8 ZK9 ZK10	FK2 FK3 FK4 FK5 FK11 FK12
10	VB1.3	engineering analysis of the elements of aviation engineering	Objective: to provide a basic understanding of performance engineering analysis NDS design elements aviation technology at their static loading using the finite element method implemented in the computer integrated CAD / CAE system ANSYS and ANSYS Workbench. Objective: Students obtain knowledge about contemporary performance engineering analysis NDS design elements aviation technology using finite element method implemented in a computer integrated CAD / CAE system ANSYS and ANSYS Workbench	ZK1 ZK2 ZK4 ZK5 ZK7 ZK8 ZK9 ZK10	FK1 FK2 FK3 FK4 FK5 FK11 FK12
11	VB1.4	Integrated design of aircraft and helicopters	Purpose: acquisition and consolidation of skills of independent research and engineering work in production and research teams of enterprises and organizations. Objective: To consolidate the theoretical knowledge and skills, mastery of technique research and experiments in real practice experts that level, the development of creativity, the ability to apply their knowledge in practice, collecting materials needed to perform the qualifying final work of Master	ZK1 ZK2 ZK4 ZK5 ZK7 ZK8 3K9 3K10	ΦK1 ΦK2 ΦK3 ΦK4 ΦK5 ΦK11 ΦK12
III semester					
12	OK3	Research work	Purpose: to give knowledge in the field of organization of research and inventive	3K1	ΦK2

			activity, to teach methods of preparation, carrying out experimental researches, processing of results of experiments and registration of the scientific report on results research. Task: mastering the methods of theoretical, experimental research in the aviation industry.	3K2 3K3 3K4 3K5 3K6 3K7 3K8 3K10	ΦK3 ΦK4 ΦK5 ΦK9 ΦK11 ΦK13 ΦK14 ΦK15
13	OK4	Psychology and pedagogy of higher school	Purpose: to reveal features of pedagogical process within the limits of interaction of student and teacher with the purpose of formation of professional qualities, Objective: To show the characteristics of the educational process of higher education, to reveal the form of the educational process and the use of educational technology, create the ability to interact with the student audience	ZK1 ZK2 ZK4 ZK5 ZK6 ZK8 ZK10	FK6
14	VB1.4	Integrated design airplanes and helicopters	Objective: acquisition and consolidation of independent research skills -research and engineering work in production and research teams of enterprises and organizations. Objective: To consolidate the theoretical knowledge and skills, mastery of technique research and experiments in real practice experts that level, the development of creativity, the ability to apply their knowledge in practice, collecting materials needed to perform the qualifying final work of Master	ZK1 ZK2 ZK4 ZK5 ZK6 ZK7 ZK8 ZK9 ZK10	FK1 FK2 FK3 FK4 FK5 FK6 FK8 FK9 FK11 FK13 FK14 FK15 FK16
15	VB1.7	Aviation technical translation	Objective: to determine the level of preparedness of students to solve complex modern scientific and applied problems under the generalized object of activity on the basis of the system theoretical knowledge and practical skills acquired during the entire period of study in accordance with the requirements of the standard of higher education. Objectives: systematization, consolidation and expansion of theoretical knowledge obtained in the	3K1 3K3 3K4 3K5 3K7 3K8 3K10	ΦK1 ΦK2 ΦK3 ΦK4 ΦK5 ΦK9 ΦK11 ΦK12 ΦK13

			process of training in the educational-scientific program "Airplanes and Helicopters" training master's degree, and their practical use in solving specific scientific, applied, engineering, economic, social and industrial issues in a certain field of professional activity; development of skills of independent work, mastering of a technique of researches and experimentation, physical or 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 preparation of the graduate to the requirements of educational degrees, the characteristics of the specialist, his readiness and ability to work independently in a market economy, modern production, progress of science, technology and culture.		ΦK14 ΦK15 ΦK16
16	BB1.5	Efficiency and reliability of aviation equipment	Purpose: acquisition and consolidation of skills of independent research and engineering enterprises and organizations. Objective: To consolidate the theoretical knowledge and skills, mastery of technique research and experiments in real practice experts that level, the development of creativity, the ability to apply their knowledge in practice, collecting materials needed to perform the qualifying final work of Master	ZK1 ZK2 ZK4 ZK5 ZK8 ZK10	FK5
17	VB1.6	Certification of aircraft and helicopters	Purpose: acquisition and consolidation of skills of independent research and engineering work in production and research teams of enterprises and organizations. Objective: To consolidate the theoretical knowledge and skills, mastery of technique research and experiments in real practice experts that level, the development of creativity, the ability to apply their knowledge in practice, collecting materials needed to perform the qualifying final work of Master	ZK1 ZK2 ZK4 ZK5 ZK8 ZK10	FC5
IV semester					
19	OK8	Diploma projects	Objective:determine the level of preparedness of students to solve complex modern scientific and applied problems under the generalized object	ZK1 ZK2 ZK3	FK1 FK2 FK3

		<p>activity based on application of theoretical knowledge and practical skills acquired during the entire period of study in accordance with the requirements of the standard of higher education.</p> <p>Objectives: systematization, consolidation and expansion of theoretical knowledge obtained in the educational process under the educational-professional program "Airplanes and Helicopters" training master's degree, and their practical use in solving specific scientific, applied, engineering, economic, social and industrial issues in a certain field of professional activity; development of skills of independent work, mastering of a technique of researches and experimentation, physical or 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 preparation of the graduate to the requirements of educational degrees, the characteristics of the specialist, his readiness and ability to work independently in a market economy, modern production, progress of science, technology and culture.</p>	<p>ZK4</p> <p>ZK5</p> <p>ZK6</p> <p>ZK7</p> <p>ZK8</p> <p>ZK9</p> <p>ZK10</p> <p>ZK11</p> <p>ZK12</p>	<p>FK4</p> <p>FK5</p> <p>FK10</p> <p>FK11</p> <p>FK12</p> <p>FK13</p> <p>FK14</p> <p>FK15</p>
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4 Form certification candidates Higher Education

Certification graduates in educational and scientific program "Airplanes and helicopters" specialty 134 "Aviation and space-rocket technique "is carried out in the form of defense of the qualifying master's thesis and ends with the issuance of a standard document on awarding him a master's degree with the qualification: Master of Aircraft and Helicopters.

Certification is carried out openly and publicly.

5 Matrix matching components competences educational program

co mp ete nci esS oft wa re ten tno sti	Components educational program															
	O K 1	O K 2	O K 3	O K 4	O K 5	O K 6	O K 7	O K 8	V B 1 · 1	V B 1 · 2	V B 1 · 3	V B 1 · 4	V B 1 · 5	V B 1 · 6	V B 1 · 7	V B 1 · 8
ZK1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ZK2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ZK3		+					+	+	+	+			+			+
ZK4	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+
ZK5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ZK6		+		+	+	+	+	+		+	+				+	
ZK7		+	+	+	+		+	+	+	+	+	+	+	+	+	+
ZK8	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ZK9			+				+	+	+		+					
ZK10	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
FK1			+				+	+	+	+	+	+	+		+	
FK2		+	+						+		+	+				
FK3		+	+	+	+		+	+	+	+	+	+		+	+	+
FK4		+	+						+		+	+	+			
FK5	+	+	+						+		+	+				
FK6						+					+				+	
FK7							+	+	+	+			+		+	
FK8							+	+	+	+	+					
FK9		+					+	+	+	+	+	+	+			
FK10													+			
FK11		+	+	+	+		+	+	+	+	+	+		+		+
FK12			+	+	+											
FK13		+					+	+	+		+	+				
FK14		+					+	+	+	+	+	+	+			
FK15		+									+	+				
ΦK1 6							+	+	+	+	+	+	+			

6 Matrix for providing program learning outcomes with relevant components of the educational program

Program learning outcomes	Components of the educational program															
	O K 1	O K 2	O K 3	O K 4	O K 5	O K 6	O K 7	O K 7	V B 1 · 1	V B 1 · 2	V B 1 · 3	V B 1 · 4	V B 1 · 5	V B 1 · 6	V B 1 · 7	V B 1 · 8
PRN1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PRN2	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PRN3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PRN4		+		+	+	+	+	+		+	+				+	
PRN5		+	+	+			+	+	+	+	+	+	+	+	+	+
PRN6	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PRN7	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PRN8	+															
PRN9					+	+					+				+	
PRN10							+	+	+	+			+		+	
PRN11							+	+	+	+	+					
PRN12		+					+	+	+	+	+	+	+			
PRN13													+			
PRN14		+	+	+			+	+	+	+	+	+		+		+
PRN15				+												
PRN16		+					+	+	+		+	+				
PRN17		+					+	+	+	+	+	+	+			
PRN18		+									+	+				
PRN19							+	+	+	+	+	+	+			