MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

National Aerospace University. ME Zhukovsky
Kharkiv Aviation Institute

APPROVED
scientific council
National Aerospace University. ME Zhukovsky
Kharkiv Aviation Institute
Chairman of the Academic Council
_____
«__» 2019, protocol № ___

EDUCATIONAL AND SCIENTIFIC PROGRAM

Technologies of production and repair of aircraft

Level of higher education - second (master's) in 134 Aviation and rocket and space technology

areas of knowledge 13 Mechanical engineering

Qualification: Master's degree in aviation and rocket and space technology

The educational program is put into operation
with «__» _____ 2019

Rector of the National Aerospace University. ME Zhukovsky Kharkiv Aviation Institute

_____ MV Nechiporuk
order № ___ from "__" _____ 2019

Kharkiv 2019

LETTER OF APPROVAL educational program

Approved by the scientific and methodological commission of the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" in the fields of knowledge "Mechanical Engineering", "Electrical Engineering" and "Transport"

Protocol № from «» 2019

Chairman _____ MA Shvetsov
(signature)

Recommended by the Scientific and Methodological Council of the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute".

Protocol № from «» 2019

Chairman _____ C. M. Pavlenko
(signature)

PREFACE

Educational and scientific program "Technologies for the production of aircraft" in the specialty 134 "Aviation and rocket and space technology" for the preparation of masters developed by the project team of the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" consisting of:

a) project team:

Project team leader:	Plankovsky SI	Doctor of Technical Sciences, Professor, Professor of the Department of Aircraft Production Technology
Project team members:	Zastela OM	Candidate of Technical Sciences, Associate Professor, Professor of the Department of Aircraft Production Technology
	Sikulsky VT	Candidate of Technical Sciences, Associate Professor, Professor of the Department of Aircraft Production Technology

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 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:

– 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.

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

– volume and term of master's studies;

– 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 scientific program is used for:

– drawing up curricula and working curricula;

– formation of individual plans of students;

– formation of working programs of academic disciplines, practices;

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

– accreditation of educational and scientific program;

– internal and external quality control of training;

– certification of masters in the educational and scientific program "Technology of aircraft production" in the specialty 134 "Aviation and rocket and space technology".

Users of the educational and scientific program:

– applicants for higher education studying at the National aerospace university them. ME Zhukovsky "Kharkiv Aviation Institute";

– scientific and pedagogical workers who train masters in the educational and scientific program "Technology of aircraft production" in the specialty 134

"Aviation and rocket and space technology";

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

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

The educational and scientific 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 Production Technologies" in the specialty 134 "Aviation and Rocket and Space Engineering".

1 REGULATORY REFERENCES

The educational and scientific 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 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 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 Regulation "On the organization of the educational process" SUYA KHAI-NOV-P / 005: 2016 of the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute", approvedAcademic Council of the University from 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 students are trained, 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, C.A. Kalashnikov, VI Луговий, A.B. Stavytsky, Yu.M. Рашкевич, Ж.B. Talanova / Ed .. V.G. Flint. - Kyiv: Pleiades Publishing House LLC, 2014. - 100 p.

1.16 Standard of higher education of Ukraine of the second (master's) level of knowledge 13 «Mechanical engineering", Specialty 134" Aviation and rocket and space technology "(project) - K .: MES of Ukraine, 2018. - 19 p.

2 PROFILE OF THE EDUCATIONAL AND SCIENTIFIC PROGRAM "TECHNOLOGIES AIRCRAFT MANUFACTURING "BY SPECIALTY "AVIATION AND ROCKET AND SPACE EQUIPMENT"

1 - General information	
Full name of the higher educational institution and structural subdivision	National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" Department of Aircraft Production Technology
Degree of higher education and title of qualification in the original language	**Degree of higher education - master** **Qualification: Master's degree in aviation and rocket and space technology** **according to the educational program "Technologies of production and repair of aircraft".** **Degree - Master** **Qualification: Master of Science in Aerospace Engineering under educational program**«Aircraft manufacturing and repair technologies»
The official name of the educational and scientific program	**"Technologies for the production and repair of aircraft"** «Aircraft manufacturing and repair technologies»
Type of diploma and scope of educational and scientific program	**Single 120 ECTS credits / 1 year 9 months**
Availability of accreditation	**Certificate of accreditation: Series ND-IV № 2172040, issued on 02.09.2014 on the basis of the order of the Ministry of Education and Science of Ukraine dated 15.07.2014 № 262v** **Accreditation period: 10 years**
Cycle / level	**The second (master's) level** **NRC of Ukraine - level 7**
Prerequisites	**A person has the right to obtain a master's degree if he has 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.
Validity of educational and scientific program	**Five years**
Internet address of the permanent placement of the description of the educational-scientific program	**http://kafedra104.khai.edu/uk/site/napryami-pidgotovki-i-spe.html**
2 - The purpose of the educational program	
1 Training of specialists capable of solving complex problems and problems in professional activities related to the production of aircraft, which are associated with the implementation of innovations and are characterized by uncertainty of conditions and requirements **2 Formation of the personality of the expert capable to use professional-profile knowledge and practical skills for the decision of problems in the field of manufacture of aircrafts.**	
3 - Characteristics of the educational and scientific program	
Subject area	**Objects of study - phenomena and problems related to the stages of**

	the life cycle of aviation and space technology, which require updating and integration of knowledge in terms of incomplete / insufficient information and conflicting requirements. **The purpose of training -~~надбання компетентностей~~training~~,~~ ~~які забезпечують~~ able~~ість~~them to solve complex problems and problems in professional activities related to the production of aerospace and rocketry, which are associated with the implementation of innovations and are characterized by uncertainty of conditions and requirements.** **Ttheoretical content of the subject area - models of physical processes in objects of aviation and rocket and space technology, ~~новітні~~ modern concepts of deformable solid mechanics, aero- and gas dynamics, thermophysics and electrical engineering.** **Methods, techniques and technologies -~~новітні~~ modern analytical, numerical and experimental methods of research of the subject area, methods and technologies for solving complex problems and problems related to the stages of the life cycle of aviation and space technology.** **Instruments and equipment - laboratory equipment with measuring instruments, in particular hydraulic stands, wind tunnels, equipment for research of material properties, stress-strain state of structures; assembly and testing equipment~~конструкцій~~ aviation and rocket and space technology; computers with informational and specialized software~~, зокрема системами комп'ютерних розрахунків, геометричного моделювання, скінченно-елементного аналізу, інтегрованого~~ for design and manufacture of aircraft and rocket and space technology structures.**
Orientation of the educational and scientific program	**Educational and scientific**
The main focus of the educational and scientific program (specialization)	**The educational and scientific program establishes qualification requirements for social and production activities of graduates of higher education institutions in the specialty 134 "Aviation and Rocket and Space Engineering" with a master's degree and state requirements for the properties and qualities of a person who has obtained a certain level of education. educational and scientific program "Technology of aircraft production".**
Features of the program	**The practice is carried out at the enterprises of aviation and rocket and space industry. The research (scientific) component of the program is 30 percent of its volume.**
4 - Suitability of graduates for employment and further study	
Suitability for employment	**Graduates can work in the specialty in accordance with the qualification "Master of Aviation and Rocket and Space Engineering" and hold positions** according to the classification of economic activities according to DK 009-2010: Section C - Manufacturing. Section 30 - Manufacture of other transport equipment Group 30.3 - Manufacture of air and spacecraft, related equipment Class 30.30 - Manufacture of aircraft and spacecraft, related equipment. In accordance with the curriculum can perform professional work on DK 003-2010: Section 1 - Legislators, senior civil servants, managers, managers (managers). Subsection 12 - Heads of enterprises, institutions and organizations.

	Class 122 - Heads of production and other major departments Subclass 1222.2 - Chiefs (other managers) and masters of production sites (divisions) in industry. Section 2 - Professionals. Subsection 21 - Professionals in the fields of physical, mathematical and technical sciences. Class 214 - Professionals in architecture and engineering. Subclass 2145.2 - Mechanical engineers 2149.2 - Engineers (other branches of engineering) and hold the primary positions provided for in the staff list for professional purposes: CODE ZKPPTR - 23434 Master shop CODE ZKPPTR - 23901 Head of the flight test department CODE ZKPPTR - 22203 Test engineer of the onboard flight laboratory ZKPPTR CODE - 20288 Leading aircraft flight test engineer CODE ZKPPTR - 22209 Research Engineer ZKPPTR code - 22211 Design engineer (mechanics) ZKPPTR code - 22493 Technological engineer (mechanics). In addition, graduates can hold positions related to research and teaching activities: Section M - Professional, scientific and technical activities Section 72 - Research and development. Subsection 72.1 - Research and experimental development on natural sciences and engineering. Class 72.19 - Research and experimental development on other natural sciences and engineering Section P - Education. Section 85 - Education. Subsection 85.4 - Higher education. Class 85.41- Vocational and technical education at the level of higher vocational and technical institution. Class 85.42 - Higher education Can perform professional work according to DK 003-2010: Section 2 - Professionals. Subsection 21 - Professionals in the fields of physical, mathematical and technical sciences. Class 214 - Professionals in architecture and engineering. Subclass 2149.1- Researchers (engineering mechanics). Section 23 - Teachers. Class 231 - Teachers of universities and higher educational institutions. Subclass 2310.2 - Other teachers of universities and higher educational establishments and hold the primary positions provided for in the staff list for professional purposes: CODE ZKPPTR - 23667 Junior Researcher (Mechanical Engineering). CODE ZKPPTR - 20199 Assistant.
Further training	**A person has the right to continue education at the third (educational and scientific) level to obtain the degree of Doctor of Philosophy.**
5 - Teaching and assessment	
Teaching and learning	**Student-centered learning, self-study, problem-oriented learning aimed at the development of critical and creative thinking, learning through laboratory practice, dual education and more. Lectures, laboratory work, seminars, practical classes,**

	independent work based on textbooks and abstracts, consultations with teachers, preparation of master's thesis.
Evaluation	**Written exams, practice reports, current (modular) control, master's thesis and its defense.**
6 - Program competencies	
Integral competence	Ability to solve complex problems and problems in the professional development, production and certification of aerospace and rocketry, its engines and power plants, structures and systems that are related to innovation and are characterized by uncertainty of conditions and requirements
General competence (LC)	ZK1. Ability to abstract thinking, analysis and synthesis. ZK2. Ability to identify, pose and solve problems. ZK3. Ability to conduct research to solve complex problems in professional activities. ZK4. Ability to generate new ideas and implement them in the form of innovative solutions, working in a team with representatives of other professional groups. ZK5. Skills in using the latest information technologies. ZK6. Ability to adapt and act in a new situation. ZK7. Definiteness and persistence in terms of tasks and responsibilities. ZK8. Ability to further autonomous and independent learning based on the latest scientific and technical achievements. ZK9. Ability to communicate in a foreign language in professional activities.
Professional competencies of the specialty (FC)	FC1. Orientation in the history, current state, problems and prospects of development of aviation and space technology. FC2. Qualified choice of class of materials for structural elements of aviation and space technology. FC3. Ability to evaluate the technical and economic efficiency of design, research, technological processes and innovative developments. FC4. Ability to apply knowledge in the field of hydraulics, aero- and gas dynamics for mathematical modeling of phenomena and behavior of objects in professional activities by specialization. FC5. Ability to create and improve mathematical models for the analysis of the characteristics of the units of aviation and space technology using knowledge in the field of mechanics and strength of materials and structures.~~створювати та удосконалювати математичні моделі для аналізу характеристик стану агрегатів авіаційної та ракетно-космічної техніки~~ FC6. Ability to formulate and solve scientific and technical problems for the design, manufacture, testing and (or) certification of competitive samples of aviation and rocket and space technology
7 - Program learning outcomes	
	PRN1. Ability to solve complex engineering problems and problems of aerospace and / or rocket and space technology, which requires updating and integration of knowledge, including in conditions of incomplete / insufficient information and conflicting requirements. PRN2. Ability to critically comprehend the problems of aviation and / or rocket and space technology, including on the border with related fields, engineering, physics, chemistry, ecology, economics.

	PRN3. Have the skills to compile reporting documentation on the results of work on professional (scientific and technical) tasks, preparation of scientific and technical publications, reports and presentations on the results of research. PRN4. Understand and be able to use modern methods of solving inventive problems. Be able to apply various methods of intellectual property protection to technical solutions created in the course of professional (scientific and technical) activities. PRN5. Be able to use the latest specialized software to solve complex problems in professional (scientific and technical) activities in accordance with the educational program. PRN6. Demonstrate decision-making skills in the event of non-standard complex tasks in professional (scientific and technical) activities in conditions of uncertainty of requirements, availability of a range of opinions and limited time. PRN7. Ability to be responsible for the development of professional knowledge and practices of the team in aviation and / or rocket and space technology, assessment of its strategic development. PRN8. Ability to further study in the field of aerospace and rocketry, mechanical engineering and related fields of knowledge, which is largely autonomous and independent. PRN9. Demonstrate foreign language skills at a level that provides the opportunity to communicate in a professional environment and use scientific and scientific and technical documentation in the subject area. PRN10. It is reasonable to assign a class of materials for elements and systems of aviation and space technology. Demonstrate skills in choosing methods to modify their properties. PRN11. ~~Визначення й оцінювання відмінностей між формами гос-~~ ~~подарювання, тенденціями їх, розвитку.~~ Knowyou~~ння~~ ~~Описувати~~ ~~послідовність~~ calculated~~ення~~ ~~to eat~~ ~~економічної~~ economic ~~ефекти-~~ ~~вності~~ efficiency production of elements and systems of aviation rocket and space technology. PRN12. Understand the principles and demonstrate the skills of reasonable assignment of quality indicators for aerospace and rocket and space technology. PRN13. Have an idea of the principles of systems analysis, understand the causal links between significant factors and technical decisions made in solving complex problems, be able to use them in scientific and technical activities.~~;~~ PRN14. Demonstrate skills of developing physical and (or) mathematical models in solving complex professional (scientific and technical) problems related to the stages of the life cycle of aviation and space technology PRN15. Understand and be able to use methodssimilarity theory, experiment planning, demonstrate skills of measuring and processing the results of experimental research. PRN16. Have an idea of funding sources, procedures and procedures for conducting competitions for research projects and innovative developments. PRN17. Demonstrate skills of development of calculation models of objects and systems of aviation and rocket and space equipment and to carry out optimization of their parameters on various criteria of

	efficiency. PRN18. To use in professional activity the results of modeling of complex internal and external flows of gas (liquid) (including flows of compressed, reactive, electrically conductive and other media) by methods of numerical and field experiment in accordance with the curriculum. PRN19. ~~Можливість~~ Have skills ~~проводити~~ carrying out educationalthemi busyl~~тя~~ as a trainee teacher,, inusing working programs of academic disciplines, primary educational documentation of higher educational institutions.
8 - Resource support for program implementation	
Staffing	**Research and teaching staff involved in the teaching of professionally-oriented disciplines who have academic degrees and / or academic titles and meet licensing requirements.**
Material and technical software	**Training is carried out in training laboratories and computer classes of the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute". Execution of the research component of the educational and scientific program is carried out in scientific laboratories with the use of available research stands, experimental and measuring equipment.**
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 the teaching staff.**
9 - Academic mobility	
National credit mobility	**Based on bilateral agreements between the National Aerospace University. ME Zhukovsky "Kharkiv Aviation Institute" with higher education institutions and research 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 or other foreign languages, while providing knowledge to applicants** of the relevant discipline in the state language.

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

3.1 List of components of SNP

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	R&D and intellectual property	4	test
OK2	Human factor engineering	4	exam
OK3	Foreign language for professional purposes	4	test
OK4	Modeling and calculation of processes in ARCT	4	exam
OK5	Engineering experiment planning	4	exam
OK6	Applied issues of mechanics and materials science	5	exam
OK7	Scientific and pedagogical internship	12	test
OK8	Pre-diploma practice	10	diff. test
OK9	Diploma design	20	defense of qualifying master's thesis
The total amount of mandatory components:		67	
Selective components of OP			
Selective unit 1			
WB1.1	Scientific and applied issues of aircraft production technology	6	exam
WB1.2	Quality management, control and testing in aircraft production	6	test
WB1.3	Fundamentals of additive production	6	exam
WB1.4	Technological design of aircraft production shops	6	exam
WB1.5	Equipment and equipment for aircraft production	4	test
Selective unit 2			
WB2.1	Automated design systems for technological preparation of production	6	exam
WB2.2	Automated design systems for technological preparation of production	5	exam
WB2.3	Technology of assembly and installation works	6	exam
WB2.4	Technology of assembly and installation works (KP)	2	diff. test
WB2.5	Technological systems for quality assurance of ARCT	6	exam
The total amount of sample components:		53	
TOTAL VOLUME OF THE EDUCATIONAL PROGRAM		120	

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 Appendix A. 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 chosen 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* COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
And the semester					
1	OK2	Engineering human factor	**Goal:** theoretical and practical training of students on the application of advanced concepts and principles of human factor engineering and cognitive ergonomics for the organization and optimization of human interaction and complex technical systems. **Task:**formation of students' system of scientific knowledge and professional skills in the field of ensuring the efficiency, reliability and safety of the existence of complex human-machine systems. They are as follows: - mastering the basic principles of engineering design from the standpoint of the person who will make decisions in this system; - consideration in the design of functional relationships between people and mechanisms; - mastering the basic principles of technical design and engineering psychology; - solving issues of organization and optimization of human labor activity in the systems "man-machine-environment"; - mastering the methods and means of analysis of engineering design for compatibility with humans	ZK1 ZK2 ZK6 ZK7 ZK8	
2	OK3	Foreign Language for professional purposes	**Goal:** ensuring the ability to communicate in a foreign language in professional and scientific and technical activities. **Task:** formation of foreign language	ZK6 ZK7 ZK8 ZK9	

№ for / n	*Code* COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			skills at a level that provides the opportunity to communicate in a professional environment and the use and preparation of scientific and scientific-technical documentation in the subject area, including the preparation of scientific publications		
3	OK5	Planning engineering experiment	**Goal:** ensuring the ability to conduct experimental research to solve complex problems in professional and scientific and technical activities. **Task:** acquisition of skills to develop methods of conducting experiments in solving complex professional (scientific and technical) problems, including the ability to use methods theory onsimilarities; skills experiment planning, measuring and processing the results of experimental research using mathematical statistics.	ZK1 ZK2 ZK3 ZK7 ZK8	FC6
4	WB2.1	Systems automated design of technological training production	**Goal:** ensuring the ability to systematically solve problems of automation of technological processes in the production of ARCT using the latest information technologies. **Task:** providing knowledge, skills and abilities needed to solve complex engineering problems in the design and production of ARCT in an information-integrated enterprise, the use of modern CAD / CAM systems to solve problems of preparation for the production of ARCT using automated equipment.	ZK1 ZK2 ZK5 ZK6 ZK7 ZK8 ZK9	FC6
5	WB1.4	Technological designing shops aircraft production	**Goal:** providing a set of knowledge on the basis of which thorough and rational design decisions are made regarding the technological design of the production site or shop of the aviation enterprise. **Task:** formation of students' skills in technological calculations and the use of design techniques for various types of shops of the main production of the aviation enterprise.	ZK1 ZK2 ZK7 ZK8	FC3 FC6
6	WB2.3	Technology assembly and installation work	**Goal:** providing knowledge of a systematic approach in the design of modern technologies for assembly and installation and organization of ARCT	ZK1 ZK2 ZK7 ZK8	FC1 FC3 FC6

№ for / n	*Code* COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			production using the latest information technologies. **Task:**formation of a set of knowledge on the use of methods for designing technical processes for assembling standard structures of units, sections, compartments and units; analysis of the design for manufacturability; designing the scheme of assembly and binding of equipment; selection of standard equipment for technical processes; methods of designing assembly equipment, cycle schedules of current production. and. methods of calculation on the accuracy of assembly.		
II semester					
7	OK1	NIR and intellectual property	**Goal:** formation of students' ability to generate new ideas and knowledge about ways to implement them in the form of innovative solutions, principles of legal protection and commercialization. **Task:** formation and development of skills of preparation of scientific and technical publications, reports and presentations on the results of the performed researches. Providing skills in solving inventive tasks and patenting inventions.	ZK1 ZK2 ZK3 ZK4 ZK6 ZK7 ZK8	FC1 FC6
8	OK4	Modeling and calculation processes in the ARCT	**Goal:** software ableawns creatureing and perfecteding Mathematicalthem modelIt processes in the ARCT on the basis of knowledge in the field of hydraulics, aero- and gas dynamics, mechanics of deformed solids. **Task:** formation of skills of research of processes in ARKT by carrying out numerical experiment; skills of application of parametric optimization means in modern computer software packages; formation and development of skills of work in the environment of modern ITU packages including: creation of settlement grids; development of calculation models for solving problems of research of processes in ARCT in integrated calculation packages of ITU; preparation of technical reports on numerical experiments	ZK1 ZK2 ZK3 ZK5 ZK7 ZK8 ZK9	FC1 FC2 FC4 FC5 FC6
9	OK6	Applied	**Goal:** providing withdateawns apply	ZK1	FC2

№ for / n	*Code* COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
		questions of mechanics and materials science	knowledge in the field of mechanics and strength of materials and structuresfor definition state and improvement of ARCT facilities **Task:** formation of skills of analysis of tasks related to the development and production of ARCT, including on the border with related fields: engineering, physics, chemistry; ability to reasonably assign a class of materials for elements of aerospace and rocketry, including skills in choosing methods for modifying their properties	ZK2 ZK3 ZK7 ZK8	FC4 FC5
10	WB2.2	Systems computer-aided design technological training production	**Goal:** ensuring the ability to systematically solve problems of automation of technological processes in the production of ARCT using the latest information technologies. **Task:** providing knowledge, skills and abilities needed to solve complex engineering problems in the design and production of ARCT in an information-integrated enterprise, the use of modern CAD / CAM systems to solve problems of preparation for the production of ARCT using automated equipment.	ZK1 ZK2 ZK5 ZK6 ZK7 ZK8 ZK9	FC3 FC6
11	WB2.4	Technology assembly and installation works (KP)	**Goal:** formation of practical skills in designing technology and equipment for the preparation of ARKT with the assessment of economic efficiency of decisions and the use of the latest information technologies. **Task:**development of technological process and equipment for assembly of standard constructions of units / sections / compartments / units of ARCT including in the conditions of incomplete information and contradictory requirements; substantiation of the accepted technical decisions by calculations of accuracy and economic efficiency.	ZK1 ZK2 ZK5 ZK7 ZK8	FC3 FC6
12	WB1.2	Management quality, control and testing in aviation	**Goal:** providing knowledge and skills on the reasonable purpose of quality indicators of ARCT objects, methods of their provision and control throughout the life cycle. **Task:**formation of knowledge about	ZK1 ZK2 ZK7 ZK8	FC6

№ for / n	*Code* COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			modern requirements for quality management systems in the production of ARCT; composition of works on testing and control of ARCT facilities and their systems at the stage of production and operation; skills of application of the newest methods to methods of control of characteristics of ARKT; knowledge of the requirements and sequence of work on certification of facilities and production of ARCT		
13	WB1.5	Equipment and equipment aircraft production	**Goal:**modern equipment and means of technological equipment of aviation production for production of monolithic details of the plane and the helicopter by dimensional processing by cutting with removal of the allowance; modern methods of manufacturing sheet, profile and tubular parts of aircraft and technological equipment. **Task:** mastering the basic systemic knowledge of technological capabilities of equipment and facilities for the manufacture of monolithic parts of aircraft and helicopters with removal of allowance, forming parts from sheets, profiles and pipes, methods and techniques of rational design of technological equipment and development of technological processes for manufacturing parts with appropriate technological documentation .	ZK1 ZK2 ZK7 ZK8	FC1 FC6
III semester					
14	OK7	Scientific and pedagogical internship	**Goal:** providing knowledge and skills for the formation of the ability to conduct research, further autonomous learning and the application of knowledge about the latest scientific and technical achievements in the educational process of higher education. **Task:**formation of knowledge about the rules of compiling a report on scientific work, its structure and content; rules for registration of master's theses;skillok conducting practical research while working in research departments on the subject of	ZK1 ZK2 ZK3 ZK4 ZK5 ZK6 ZK7 ZK8 ZK9	FC1 FC2 FC3 FC4 FC5 FC6

№ for / n	*Code* COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			master's work; preparation of reporting documentation on the results of work on the implementation of scientific and technical tasks; ~~проводити~~ carrying out educational~~і~~ busy~~тя~~ as a trainee teacher, development of working programs of academic disciplines, primary educational documentation of higher educational institutions.		
15	WB1.1	Scientific and applied problems of solid waste ARCT	**Goal:** formation of the ability to critically comprehend the problems of production of aviation and rocket and space technology and to form strategies for its further development. **Task:** formation of knowledge on the principles of systems analysis, causal relationships between significant factors and technical decisions taken in solving complex problems of MSW ARC	ZK7 ZK8 ZK1 ZK2 ZK3 ZK4 ZK5	FC1 FC2 FC6
16	WB1.3	Foundations additive production	**Goal:** acquisition of knowledge in the field of the latest methods of design and production of ARCT objects using additive and combined technologies. **Task:** formation of skills in designing aerospace structures for additive production, design of parts for manufacturing by methods of additive production, choice of production method and development of technological processes of additive production of ARCT parts	ZK1 ZK2 ZK7 ZK8 ZK9	FC1 FC2
17	WB2.5	Technological systems software life cycle of ARCT	**Goal:** formation of knowledge and skills of application in relation to modern principles and directions of development of technological systems of providing the newest level of operational characteristics of ARKT. **Task:** formation of knowledge about the influence of technological succession factors on the operational quality indicators of ARCT; modern standards of industrial purity and basic technologies for its provision; directions of development of engineering of edges and surfaces; approaches to ensuring the cleanliness of ARCT systems during operation; principles of organization of technological systems of ARCT quality	ZK1 ZK2 ZK3 ZK4 ZK6 ZK7 ZK8	FC1 FC2 FC3 FC6

№ for / n	*Code* COP	The name of the OP component	The purpose and objectives of the OP component	Formation of competencies	
				common	professional
			assurance		
IV semester					
18	OK8	Pre-diploma practice	**Goal:** acquisition and consolidation of skills of independent research and engineering work in production and research teams of enterprises and organizations. **Task:** consolidation of theoretical knowledge and skills, mastering the methods of research and experimentation in real conditions of practical activity of specialists of this level, development of creative abilities, ability to apply the acquired knowledge in practice, collection of materials necessary for qualifying master's thesis	ZK2 ZK3 ZK4 ZK5 ZK6 ZK7 ZK8	FC3 FC4
19	OK9	Diploma design	**Goal:** determining the level of student readiness to solve a set of modern scientific and 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 process of training in the educational-professional program "Technology of production and repair of aircraft" training specialist master's degree, and their practical use in solving specific scientific and applied tasks; 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.	ZK1 ZK2 ZK3 ZK4 ZK5 ZK6 ZK7 ZK8 ZK9	FC1 FC2 FC3 FC4 FC5 FC6

4 HIGHER EDUCATION CERTIFICATION FORM

Certification of graduates under the educational-professional program "Aircraft Production Technologies" in the specialty 134 "Aviation and Rocket and Space Engineering" is carried out in the form of defense of a master's thesis and ends with the issuance of a standard document on awarding him a master's degree with a master's degree. rocket and space technology in the specialty 134 "Aviation and rocket and space technology".

Certification is carried out openly and publicly

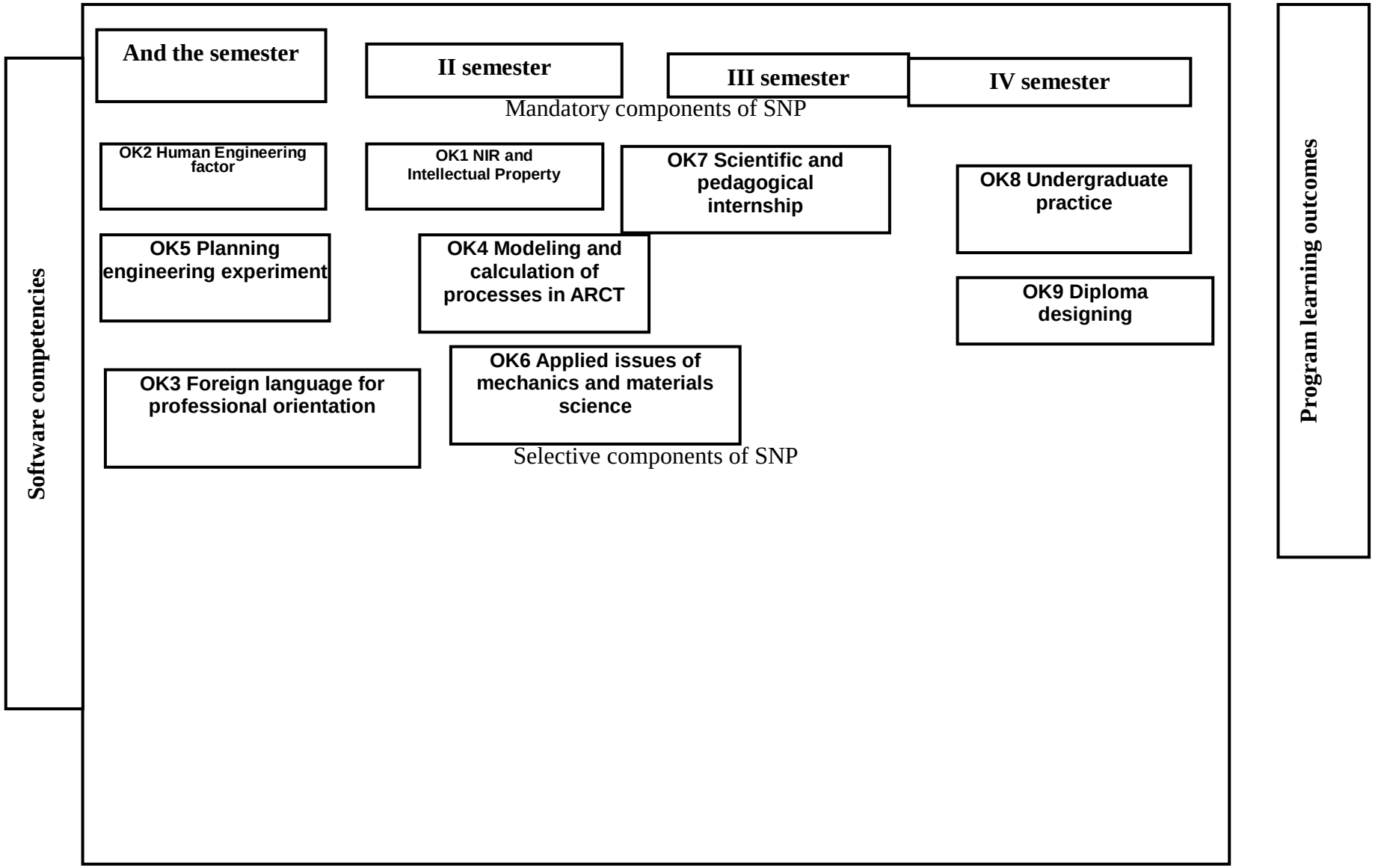
5 MATRIX OF CONFORMITY OF SOFTWARE COMPETENCIES TO COMPONENTS EDUCATIONAL AND SCIENTIFIC PROGRAM

Program competencies tnosti	Components of the educational program																		
	OK1	OK2	OK3	OK4	0K5	OK6	OK7	OK8	OK9	WB1.1	WB1.2	WB1.3	WB1.4	WB1.5	WB2.1	WB2.2	WB2.3	WB2.4	WB2.5
ZK1	+	+		+	+	+	+		+	+	+	+	+	+	+	+	+	+	+
ZK2	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ZK3	+			+	+	+	+	+	+	+									+
ZK4	+						+	+	+	+									+
ZK5				+			+	+	+						+	+		+	
ZK6	+	+	+				+	+	+	+					+	+			+
ZK7	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ZK8	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
ZK9			+	+			+		+			+			+	+			
FC1	+			+			+		+	+		+		+			+		+
FC2				+		+	+		+	+		+							+
FC3							+	+	+				+			+	+	+	+
FC4				+		+	+	+	+										
FC5				+		+	+		+										
FC6	+			+	+		+		+	+	+		+	+	+	+	+	+	+

6 MATRIX OF CONFORMITY OF SOFTWARE LEARNING RESULTS (PRN) WITH RELEVANT COMPONENTS OF THE EDUCATIONAL AND SCIENTIFIC PROGRAM

Program learning outcomes	Components of the educational program																		
	OK1	OK2	OK3	OK4	0K5	OK6	OK7	OK8	OK9	WB1.1	WB1.2	WB1.3	WB1.4	WB1.5	WB2.1	WB2.2	WB2.3	WB2.4	WB2.5
PRN1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
PRN2	+	+		+			+	+	+	+	+	+	+	+	+	+	+	+	+
PRN3				+			+	+	+						+	+	+	+	
PRN4	+						+		+	+		+							+
PRN5				+		+	+	+	+						+	+		+	
PRN6	+	+		+			+		+	+			+	+	+	+		+	
PRN7	+		+				+		+	+	+		+	+	+	+	+		+
PRN8	+		+	+			+		+	+					+	+			+
PRN9			+	+			+		+										
PRN10				+	+	+	+		+			+							
PRN11							+	+	+				+	+			+	+	
PRN12					+		+	+	+	+	+	+					+	+	+
PRN13		+			+		+		+	+									+
PRN14				+	+	+	+	+	+						+	+			
PRN15				+	+		+	+	+										
PRN16	+		+				+												
PRN17			+	+	+	+	+	+	+										
PRN18				+	+	+	+	+	+										
PRN19							+	+											

Appendix A
STRUCTURAL AND LOGICAL SCHEME OF THE EDUCATIONAL AND SCIENTIFIC PROGRAM


Software competencies
And the semester
II semester
III semester
IV semester
Mandatory components of SNP
OK2 Human Engineering factor
OK1 NIR and Intellectual Property
OK7 Scientific and pedagogical internship
OK8 Undergraduate practice
OK5 Planning engineering experiment
OK4 Modeling and calculation of processes in ARCT
OK9 Diploma designing
OK3 Foreign language for professional orientation
OK6 Applied issues of mechanics and materials science
Selective components of SNP
Program learning outcomes