

**MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE  
NATIONAL TECHNICAL UNIVERSITY OF UKRAINE  
«Igor Sikorsky Kyiv Polytechnic Institute»**

**APPROVED**

Academic Council of  
Igor Sikorsky Kyiv Polytechnic Institute  
(Protocol №10 from 13.12. 2021)  
Head of the Academic Council

**Mykhailo ILCHENKO**

**Aerospace and Rocket Systems Engineering  
EDUCATIONAL AND PROFESSIONAL PROGRAM  
the first (Bachelor) level of higher education**

<b>specialty</b>	<b>134 Aerospace and rocket-space technology</b>
<b>field of knowledge</b>	<b>13 Mechanical engineering</b>
<b>qualification</b>	<b>Bachelor in Aerospace and rocket-space technology</b>

Put into effect from 2022/2023 e.y.  
by order of the Rector  
Igor Sikorsky Kyiv Polytechnic Institute  
from 15.02.2022 №HOH/75/2022

Kyiv – 2021

## **PREAMBLE**

### **DEVELOPED by the project team:**

#### **The project team chairman**

**Oleksandr Arhipov**, Doctor of Technical Sciences, Professor,  
Professor of the Department of Space Engineering. Guarantor of Bachelor program «**Aerospace and Rocket Systems Engineering**»

#### **The project team members:**

**Ivan Korobko** Doctor of Technical Sciences, Director of the Institute of Aerospace Technologies

**Vitaliy Suhov** Doctor of Technical Sciences, Professor, Professor of the Department of Aircraft and Rocket Engineering

**Oleksandr Marynoshenko** PhD in Engineering sciences, Associate Professor , acting Head of the Department of Space Engineering,

**Oleksandr Bondarenko**, PhD in Engineering sciences, Associate Professor of the Department of Aircraft and Rocket Engineering

**Petro Yakovenko** Chief Designer, Leader of the Design Department State Enterprise “Derzh KKB “Luch”

**Ihor Luchko** Engineer of organization “AEROPRACT”

### **AGREED:**

Scientific and methodical commission of Igor Sikorsky KPI on specialty

#### **134 " Aerospace and rocket systems engineering":**

Head SMC 134  
(Protocol №2 from 03.12.2021)

**Volodymyr KABANYACHYI**

Methodical Council of Igor Sikorsky Kyiv Polytechnic Institute

Deputy Head of the Methodical Council  
(Protocol №2 from 09.12.2021)

**Anatolii MELNYCHENKO**

## **INCLUDED:**

Propositions of the enterprises in the field of aviation and space engineering of Ukraine and main development trends in specialty, labor market, branch and regional context, experience of Ukrainian (KAI, DNU) and foreign (European and American) educational programs in the same field. The educational program was discussed with the students

Recommendations for educational program update and peculiarities of curriculum development of Bachelor training (Order of Igor Sikorsky Kyiv Polytechnic Institute № HOH/35 /2020 «Improvement of educational program of the first level (bachelor) of higher education») and change of compulsory and selective education components

The results of self-analysis of the 2021 education program are considered

Recommendations of regulation and specification of multi-credits education components in semesters are considered

Update of the education program was coordinated with the stakeholders; obtained positive references are actual

Petro Yakovenko chief designer, leader of the design department State Enterprise “Derzh KKB “Luch”; Ihor Luchko Engineer of organization “AEROPRACT”

The education program was discussed after receiving all the wishes and suggestions and approved at a meeting of the Department of space engineering (protocol №14/21 from 24.11.2021).

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# 1. Profile of the educational program

1 – General information	
Full name of HEI and institute / faculty	National Technical University of Ukraine «Igor Sikorsky Kyiv Polytechnic Institute», Institute of Aerospace Technologies
Degree of higher education and title of qualification in the original language	Degree of HE – Bachelor Educational qualification – Bachelor in Aerospace and rocket-space technology
The official name of the EP	Aerospace and Rocket Systems Engineering
Type of diploma and scope of EP	Bachelor Diploma, single, 240 ECTS credits, training period 3 year and 10 months
Availability of accreditation	accreditation certificate of specialty UD 11010593, valid till 01.07.2029
Cycle/level of higher education	NQF of Ukraine – level 6 QF-EHEA – 1st cycle EQF-LLL – level 6
Prerequisites	The presence of senior secondary education
Language (s) of teaching	Ukrainian/ English
Validity of the EP	Until the next accreditation
Internet address of the permanent placement of the educational program	<a href="https://osvita.kpi.ua/op">https://osvita.kpi.ua/op</a> , <a href="http://iat.kpi.ua">http://iat.kpi.ua</a>
2 – The purpose of the educational program	
<p>The purpose of the education program is to train specialists who able to solve difficult specialized and practical problems in the area of aerospace and rocket-space technology.</p> <p>The purpose of the education program corresponds the development strategy of Igor Sikorsky Kyiv Polytechnic Institute for the period 2020-2025 based on the vision and mission.</p> <p><b>Vision</b> is to create conditions for training highly qualified specialists capable to formulate modern scientific knowledge and develop innovative technologies for the benefit of mankind and to ensure the proper position of Ukraine in the world community.</p> <p><b>Mission</b> is to make considerable contribution to the sustainable development of society by means of internationalization and integration of education, new scientific researches and innovative developments. It is necessary to create conditions for the comprehensive professional, intellectual, social and creative development of the person in the educational and scientific environment.</p>	
3 – Characteristics of the education program	
Subject area	<p><b>Objects of study</b> - phenomena and problems related to the stages of the life cycle of aerospace and rocket-space technology.</p> <p><b>Purpose of study</b> - is to train specialists able to solve complex specialized and practical problems dealing with the development, manufacturing and certification of aerospace and rocket-space technology, its engines and power plants, structures and systems characterized by the uncertainty of conditions.</p> <p><b>Theoretical content of subject area</b> are theoretical basics of development and manufacturing of aerospace and rocket-space objects and technologies.</p>

	<p><b>Methods, techniques and technologies</b> - analytical, numerical and experimental methods of research of problems of the subject area, especially integrated computer technologies, techniques and technologies dealing with the stages of the life cycle of aerospace and rocket-space technology.</p> <p><b>Tools and equipment</b> - laboratory measuring equipment with measuring facilities i.e. hydraulic stands, wind tunnels, equipment for investigation of materials properties, stress-strain state of constructions; tools and equipment for studying structure of airplanes, helicopters, rockets, engines and power plants, onboard, navigation, electric equipment; equipment for manufacturing, assembling and testing of aerospace and rocket-space objects, computers with information and specialized software for calculation and geometrical modelling, finite-element analysis, integrated design and production of aerospace and rocket-space technology.</p>
Orientation of the EP	<p>Educational and professional</p> <p>It is focused on rocket and space vehicles design and aerospace engineering.</p>
The main focus of EP	<p>The program is based on the common scientific statements including the current state of aerospace branch development. The program focuses on actual information and manufacturing technologies facilitating further professional and scientific career.</p> <p>Key words: rockets, space vehicles, aerospace engineering</p>
Features of EP	<p>Program realization implies the engaging of practitioners and experts in the professional field, employer representatives to teach students. Practice and part-time employment starting from the 3<sup>rd</sup> year of study are conducted at profile enterprises. Some disciplines are taught in foreign language.</p>
<b>4 – Suitability of graduates for employment and further study</b>	
Suitability for employment	SC 003:2010, Codes: 3115 Technical mechanic, 3121 Technician-programmer
Further training	Continuing study at the second (master) level of higher education and / or obtaining additional qualifications in post graduate study.
<b>5 – Teaching and assessment</b>	
Teaching and learning	Lectures, seminars, practical classes, computer practicums, laboratory work, course projects and works, practice and excursions, diploma project are the main forms of study.
Assessment	<p>The accomplishment and defense of laboratory and practical work, calculation and graph work, reports, written and oral exams and the defense of qualification work are evaluated.</p> <p>The assessment of students' knowledge is performed according to the Rating system of assessment adopted by Igor Sikorsky Kyiv Polytechnic Institute including all forms practical and self-directed study. Final attestation is presented in the form of diploma project.</p>
<b>6 – Program competences</b>	
Integral competence	Ability to solve complex specialized and practical problems dealing with the development, manufacturing and certification of aerospace and rocket-space technology, which implies the application of theories and methods of physics, mathematics and engineering sciences and characterized by the complexity and uncertainty of conditions.
<b>General competences (GC)</b>	
<b>GC 1</b>	Ability to use Ukrainian language for written and oral communication
<b>GC 2</b>	Ability to use foreign language for communication

<b>GC 3</b>	Ability to carry out safe activity and aspiration to save environment.
<b>GC 4</b>	Ability to use information and communicative technology
<b>GC 5</b>	Ability to work in team
<b>GC 6</b>	Ability to generate new ideas (creativity)
<b>GC 7</b>	Ability to make reasonable decisions.
<b>GC 8</b>	Ability to study and master modern knowledge.
<b>GC 9</b>	Ability to realize duties and responsibilities as a member of society, values of free democratic society and the necessity of its sustainable development, supremacy of law, rights and freedoms of human and citizen of Ukraine.
<b>GC 10</b>	Ability to save and enrich moral, cultural, scientific values and achievements based on the knowledge of history and trends of subject area development, its place in the common system of knowledge about nature and society and society development, technics and technologies, apply different kinds and forms of physical activity for leisure and healthy life style.
<b>GC 11</b>	Ability to work autonomously.
<b>GC 12</b>	Ability to organize and use collaborative discussions of methods for solving unusual design problems.
<b>GC 13</b>	Ability to interpersonal relation.
<b>Professional competences (PC)</b>	
<b>PC 1</b>	Ability to use the theory of flight dynamics and control at designing of aerospace and rocket-space technology
<b>PC 2</b>	Ability to use knowledge of hydraulics, air and gas dynamics to describe the interaction of bodies with gas and hydraulic environment
<b>PC 3</b>	Ability to choose the optimal materials for the construction components of aircraft and rocket and space technology.
<b>PC 4</b>	Ability to calculate the strength of components of aircraft and rocket and space technology
<b>PC 5</b>	Ability to design and test the components of aircraft and rocket and space technology, its equipment, systems and subsystems
<b>PC 6</b>	Ability to develop and implement technological processes of aircraft and rocket and space technology manufacturing
<b>PC 7</b>	Skills to use information and communicative technologies and specialized software in studying and professional activity
<b>PC 8</b>	Ability to consider economic and managerial aspects of aircraft and rocket and space technology manufacturing in professional activity
<b>PC 9</b>	Ability to develop general construction of aircraft and rocket and space technology
<b>PC 10</b>	Ability to carry out diagnostics and testing of aircraft and rocket and space technology and its vibrational protection
<b>PC 11</b>	Ability to determine the optimal type and parameters of rocket and space vehicle power plant
<b>PC 12</b>	Ability to plan wind tunnel experiments and to control their implementation
<b>PC 13</b>	Ability to provide metrological support, standardization and certification of structural elements of rocket and space vehicles by means of calculation methods and considering technological and functional interchangeability
<b>PC 14</b>	Skills to use integral technologies of computer design and modeling of aircraft and rocket and space systems and elements
<b>7 – Program results of learning</b>	
<b>PRL 1</b>	Ability to know aerodynamic modeling and assess rocket parameters by means of specialized computer means and wind tunnel experiments
<b>PRL 2</b>	Knowledge of development methods of modern applied software for conducting quick nonstandard calculation or analyzing huge amounts of data
<b>PRL 3</b>	Understand environmentally dangerous and harmful factors of professional activity and regulate its content in order to avoid negative effect on environment

<b>PRL 4</b>	Understand the principles of gas and liquid mechanics, as well as, hydraulics, aerodynamics (gas dynamics)
<b>PRL 5</b>	Understand the features of working processes in hydraulic, pneumatic, electric and electronic systems, servo motors used in aircraft and rocket and space technology
<b>PRL 6</b>	Understand and reason the sequence in design, production, testing and/or certification of aircraft and rocket and space objects and elements at all stages of their life cycle.
<b>PRL 7</b>	Understand the structure and principles of operation of onboard and navigation equipment of aircraft and rocket and space technology
<b>PRL 8</b>	Understand and reason the features of structure based on main aspects of working processes in aircraft and rocket and space elements and systems
<b>PRL 9</b>	Understand the theoretical principles and practical methods of equipment support of components interchangeability of aircraft and rocket and space technology
<b>PRL 10</b>	Describe the models and stress-strain state of aircraft mechanical structures and elements by means of modern integral technologies of computer design
<b>PRL 11</b>	Develop the structure of rocket and space vehicles
<b>PRL 12</b>	Calculate the power plants of rockets and space vehicles: pulse engines, gas and gas turbine engines, flywheel engines, liquid and solid fuel rocket engines, solar batteries, generators, servo motors.
<b>PRL 13</b>	Conduct diagnostics and nondestructive control of flying vehicles elements.
<b>PRL 14</b>	Master the modern means of information and communicative technologies in the amount sufficient for studying and professional activity.
<b>PRL 15</b>	Acquire logics and methodology of scientific cognition based on understanding of modern state and methodology of subject area
<b>PRL 16</b>	Describe metals and nonmetals and know modification methods of their properties. Determine optimal materials for aircraft and rocket and space elements considering their structure, physical, mechanical, chemical and operational properties, as well as, economic factors
<b>PRL 17</b>	Describe experimental research methods of structural, physical and mechanical technological properties of materials and structures.
<b>PRL 18</b>	Apply modern methods of modeling, design and manufacturing of aircraft and rocket and space elements and systems
<b>PRL 19</b>	Acquire skills of determining structural elements stress of aircraft and rocket and space technology at all stages of their life cycle
<b>PRL 20</b>	Calculate stress-strain state, determine carrying capacity of structural elements and reliability of aircraft and rocket and space technology
<b>PRL 21</b>	Skills to develop technological processes using computer aided design to manufacture the structural components of aircraft and rocket and space technology
<b>PRL 22</b>	Explain the influence of structural parameters of rocket and space vehicles on their performance. Know methods of stability and controllability of aircraft and rocket and space technology
<b>PRL 23</b>	Ability to use Ukrainian and foreign languages for fluent oral and written communication in professional activity
<b>PRL 24</b>	Explain solutions and give arguments in their favor in reasonable and clear form
<b>PRL 25</b>	Skills for self-directed study and autonomous work for increasing professional qualification and solving the problems in new and unknown environment
<b>PRL 26</b>	Formulate the reasonable assessment of governmental organizations activity, political institutions from the point of view of mankind, democratic values, human rights and freedoms priority
<b>PRL 27</b>	Follow the requirements of branch documentation dealing with the design procedures, manufacturing, testing and/or certification of aircraft and rocket and space systems and their elements at all stages of life cycle
<b>PRL 28</b>	Assess economic efficiency of manufacturing of aircraft and rocket and space systems and elements



<b>8 – Resource support for program implementation</b>	
Staffing	Exchange programs of students and lecturers between partner universities, coordination of the content of disciplines with the related disciplines of profile educational institutions are possible. It meets the requirements of staffing of providing education activity for the particular level of higher education adopted by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187 in the current version. The provision of education process is performed by the staff of the department consisting of 3 professors, Doctor of sciences; 4 assistant professors with PhD; 1 senior teacher and 1 assistant.
Material and technical support	In accordance with the technological requirements for material and technical support of education activities of the particular level of higher education, approved by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187 in the current version. The education process of specialists training is fully provided of studying areas, necessary equipment, computer equipment, specialized laboratories, and access to information resources. Three computer laboratories such as diagnostic laboratory, laboratory of aviation technique samples with the military and transport airplanes, helicopter, units and mechanisms and laboratory for both students and organization “Firefly Aerospace” are used.
Information and education and methodical support	In accordance with the technological requirements for education and methodological and information support of education activities of the particular level of higher education approved by the Resolution of the Cabinet of Ministers of Ukraine dated 30.12.2015 № 1187 in the current version. Applicants of higher education use information resources and studying environment of KPI library, Campus and education resources of Sikorsky platform, sites of the departments.
<b>9 – Academic Mobility</b>	
National credit mobility	Agreement on academic mobility is signed with Dnipro National University
International credit mobility	Students take part in the programs of academic mobility (Erasmus + KI) with the University of the Basque Country (Spain), Warsaw University of Technology (Poland), ENS Lyon (France).
Training of foreign applicants of higher education	Foreign students have the ability to study in separate groups in English with the studying of Ukrainian as a foreign language. In mixed groups they are trained in Ukrainian language.

## 2. List of components of education program

Code	Components of education program (academic disciplines, course projects / works, practices)	Number of ECTS credits	Form of final control
1	2	3	4
<b>Compulsory (regulatory) components of the EP</b>			
<b>General training cycle</b>			
3O 1	Ukrainian Language for Professional Purposes	2	Test
3O 2	History of Science and Technology	2	Test
3O 3	Basics of a Healthy Lifestyle	3	Test
3O 4.1	Foreign Language. Part 1	3	Test
3O 4.2	Foreign Language. Part 2	3	Test
3O 5	Economics and Management of Enterprise	4	Test
3O 6	Labor Safety and Civil Defense	4	Test
3O 7	General theory of Development	2	Test
3O 8	Environmental Safety of Engineering Activities	2	Test
3O 9	Business Law	2	Test
3O 10.1	Foreign Language for Professional Purposes. Part 1	3	Test
3O 10.2	Foreign Language for Professional Purposes. Part 2	3	Exam
<b>Professional training cycle</b>			
ПО 1.1	Higher Mathematics. Part 1. Differential Calculus. Analytic Geometry. Linea Algebra.	7	Exam
ПО 1.2	Higher Mathematics. Part 2. Integral Calculus	7	Exam
ПО 1.3	Higher Mathematics. Part 3. Differential Equations. Analytic Functions	4	Exam
ПО 2.1	Physics. Part 1. Mechanics. Molecular Physics.	5	Exam
ПО 2.2	Physics. Part 2. Electromagnetism. Optics. Atomic Physics.	5	Exam
ПО 3	Chemistry	3	Test
ПО 4.1	Theoretical Mechanics. Part 1. Statics. Kinematics.	6	Exam
ПО 4.2	Theoretical Mechanics. Part 2. Dynamics.	4	Exam
ПО 5	Electrical Engineering and Electronics	3	Test
ПО 6	Descriptive Geometry	4	Exam
ПО 7	Engineering and Computer Graphics	4	Test
ПО 8	Theory of Mechanisms and Machines	4	Test
ПО 9.1	Materials and Constructions Mechanics. Part 1. Basic Course	3	Test
ПО 9.1	Materials and Constructions Mechanics. Part 2. Stiffness and Stability of Complex Elastic Systems	4,5	Exam
ПО 10	Machines Details and Basics of Aircraft Designing	5	Exam
ПО 11	Hydrogas Dynamics and Thermodynamics	6,5	Exam
ПО 12	Engineering Basics of Aviation and Astronautics	3	Test
ПО 13	Aircraft Structure	4	Exam
ПО 14	Aircraft Structure. Course Project	1,5	Test
ПО 15	Design of Satellites	5	Exam
ПО 16	Technical Measuring and Certification	4	Exam
ПО 17	Metrology and Standardization	4	Exam
ПО 18	Theory of Automatic Control	5	Exam
ПО 19	Theory of Automatic Control. Course Work	1	Test
ПО 20	Aerodynamics of Aircraft	4,5	Test
ПО 21	Aerospace materials Science	4	Test

Code	Components of education program (academic disciplines, course projects / works, practices)	Number of ECTS credits	Form of final control
1	2	3	4
ΠΟ 22	Flight Dynamics	3,5	Exam
ΠΟ 23	Technology of Production of Aircraft and Engines	4	Exam
ΠΟ 24	Technology of Production of Aircraft and Engines. Course Work	1	Test
ΠΟ 25.1	Information Technologies and General Methods of Applied Software Development. Part 1. Information Technology	3	Test
ΠΟ 25.2	Information Technologies and General Methods of Applied Software Development. Part 2. Basics of industrial programming	3	Test
ΠΟ 25.3	Information Technologies and General Methods of Applied Software Development. Part 3. Development of software for solving engineering problems	3	Test
ΠΟ 26	Design of Rocket and Spacecraft Power Plants	6,5	Exam
ΠΟ 27	Pre-diploma Practice	6	Test
ΠΟ 28	Diploma Design	6	Defense
<b>Selective components of EP</b>			
<b>General training cycle</b>			
3B 1	Educational Component of 1 GU-Catalogue	2	Test
3B 2	Educational Component of 2 GU-Catalogue	2	Test
<b>Professional training cycle</b>			
ΠΒ 1	Educational Component of 1 F-Catalogue	4	Test
ΠΒ 2	Educational Component of 2 F-Catalogue	4	Test
ΠΒ 3	Educational Component of 3 F-Catalogue	4	Test
ΠΒ 4	Educational Component of 4 F-Catalogue	4	Test
ΠΒ 5	Educational Component of 5 F-Catalogue	4	Test
ΠΒ 6	Educational Component of 6 F-Catalogue	4	Test
ΠΒ 7	Educational Component of 7 F-Catalogue	4	Test
ΠΒ 8	Educational Component of 8 F-Catalogue	4	Test
ΠΒ 9	Educational Component of 9 F-Catalogue	4	Test
ΠΒ 10	Educational Component of 10 F-Catalogue	4	Test
ΠΒ 11	Educational Component of 11 F-Catalogue	4	Test
ΠΒ 12	Educational Component of 12 F-Catalogue	4	Test
ΠΒ 13	Educational Component of 13 F-Catalogue	4	Test
ΠΒ 14	Educational Component of 14 F-Catalogue	4	Test
<b>Total amount of compulsory education components:</b>		<b>180</b>	
<b>The total amount of selective education components:</b>		<b>60</b>	
The volume of educational components that ensure the acquisition of competencies of certain CSOs		<b>147</b>	
<b>TOTAL AMOUNT OF EDUCATION PROGRAM COMPONENTS</b>		<b>240</b>	

### 3. Structural and logical scheme of education program

I Semester	II Semester	III Semester	IV Semester	V Semester	VI Semester	VII Semester	VIII Semester
PO 1 Higher Mathematics	PO 1 Higher Mathematics	PO 1 Higher Mathematics	PO 18 Theory of Automatic Control	PO 17 Theory of Automatic Control	PO 18 Technical Measuring and Certification		
PO 2 Physics	PO 2 Physics	PO 5 Electrical Engineering and Electronics	PO 18 Theory of Automatic Control, Course Work	PO 24 Technology of Production of Aircraft and Engines, Course Work		PO 14 Aircraft Structure, Course Project	PO 22 Flight Dynamics
PO 6 Descriptive Geometry	PO 7 Engineering and Computer Graphics	PO 8 Theory of Mechanisms and Machines	PO 10 Machines Details and Basics of Aircraft Designing	PO 23 Technology of Production of Aircraft and Engines	PO 15 Design of Satellites	PO 13 Aircraft Structure	
PO 3 Chemistry	PO 4 Theoretical Mechanics	PO 4 Theoretical Mechanics	PO 9 Materials and Constructions Mechanics	PO 9 Materials and Constructions Mechanics			PO 28 Diploma Design
PO 12 Engineering Basics of Aviation and Astronautics		PO 11 Hydrogas Dynamics and Thermodynamics	PO 26 Design of Rocket and Spacecraft Power Plants	PO 28 Aerodynamics of Aircraft	PO 3 Educational Component of 3 F-Catalogue	PO 8 Educational Component of 9 F-Catalogue	PO 27 Pre-diploma Practice
PO 25 Information Technologies and General Methods of Applied Software Development	PO 25 Information Technologies and General Methods of Applied Software Development	PO 25 Information Technologies and General Methods of Applied Software Development	PO 21 Aerospace materials Science		PO 4 Educational Component of 4 F-Catalogue	PO 9 Educational Component of 11 F-Catalogue	
					PO 5 Educational Component of 5 F-Catalogue	PO 10 Educational Component of 10 F-Catalogue	PO 12 Educational Component of 12 F-Catalogue
				PO 1 Educational Component of 1 F-Catalogue	PO 6 Educational Component of 6 F-Catalogue	PO 11 Educational Component of 11 F-Catalogue	PO 13 Educational Component of 13 F-Catalogue
SO 2 History of Science and Technology	SO 1 Ukrainian Language for Professional Purposes	SO 1 Educational Component of 1 OU-Catalogue	SO 2 Educational Component of 2 OU-Catalogue	PO 2 Educational Component of 2 F-Catalogue	PO 7 Educational Component of 7 F-Catalogue	SO 5 Economics and Management of Enterprise	PO 14 Educational Component of 14 F-Catalogue
SO 3 Basics of a Healthy Lifestyle	SO 3 Basics of a Healthy Lifestyle	SO 7 General theory of Development	SO 8 Environmental Safety of Engineering Activities	SO 9 Business Law		SO 6 Labor Safety and Civil Defense	
SO 4 Foreign Language	SO 4 Foreign Language	SO 4 Foreign Language	SO 4 Foreign Language	SO 10 Foreign Language for Professional Purposes	SO 10 Foreign Language for Professional Purposes	SO 10 Foreign Language for Professional Purposes	SO 10 Foreign Language for Professional Purposes

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

Graduation certification of higher education applicants in the education program " Aerospace and rocket systems engineering" specialty 134 " Aerospace and rocket-space technology" is carried out in the form of defense of the qualification work and ends with the issuance of a standard document conferred Bachelor degree with qualification: Bachelor in Aerospace and rocket-space technology. The qualification work is checked for plagiarism and is placed in the repository of the NTB of the University for free access after the defense.

Graduation certification is open and public.

## 5. Matrix of program competences correspondence to the components of education program

	30 1	30 2	30 3	30 4	30 5	30 6	30 7	30 8	30 9	30 10	Π01	Π02	Π03	Π04	Π05	Π06	Π07	Π08	Π09	Π010	Π011	Π012	Π0 13	Π0 14	Π0 15	Π0 16	Π0 17	Π0 18	Π0 19	Π0 20	Π0 21	Π0 22	Π0 23	Π0 24	Π0 25	Π0 26	Π0 27	Π0 28
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## 6. Matrix for providing program learning outcomes with relevant components of education program

	30 1	30 2	30 3	30 4	30 5	30 6	30 7	30 8	30 9	30 10	Π01	Π02	Π03	Π04	Π05	Π06	Π07	Π08	Π09	Π010	Π011	Π012	Π013	Π014	Π015	Π016	Π017	Π018	Π019	Π020	Π021	Π022	Π023	Π024	Π025	Π026	Π027	Π028	
ΠΡΗ 1											+	+																		+								+	
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