MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
NON-PROFIT JOINT STOCK COMPANY
"ALMATY UNIVERSITY OF ENERGY AND COMMUNICATIONS NAMED AFTER GUMARBEK DAUKEEV"
INSTITUTE OF COMMUNICATIONS AND SPACE ENGINEERING

Gumarbek Daukeyev
Energo University

"Agreed"
Director of the Fesenkov
Astrophysical Institute
Ch. T. Omarov
«___» _____ 2025

"Approved"
Rector of AUPET
named after G. Daukeev
G.S. Nogymetov
«___» _____ 2025

MODULAR EDUCATIONAL PROGRAM
6B07128 - "AEROSPACE ENGINEERING"
direction 6B071 - "Engineering and engineering trades"

HIGHER EDUCATION

Field of education (according to the classifier dated October 13, 2020): 6B07 Engineering, manufacturing and Civil engineering.

Direction of training (according to the classifier dated 10/13/2020): 6B071 Engineering and engineering trades.

Duration of training - 4 years
Academic degree awarded – Bachelor of Engineering and Technology
Qualification level in accordance with the National Qualifications Framework: level 6.

Almaty 2025

The modular educational program (EP) was developed at the Department of Space Engineering.

Head of the educational program Koilybaeva R.K.

Director of the Institute of Communication and Space Engineering, Omarbekova A.O., Head of the Department of Space Engineering, PhD, associate professor Tolendiuly S.

The EP was considered and approved at the meeting of the Department of Space Engineering dated 28.03. 2025, Protocol No. 8

Head of the Department of SE _____ S. Tolendiuly

The EP was reviewed and approved at the meeting of the educational and methodological commission of the Institute of Communication and Space Engineering (protocol No. 8 of 29.04.2025).

Director of ICSE _____ A.O. Omarbekova

The EP was considered and approved at the AUPET Academic Council (Protocol No. 11 of 23.05.2025).

List of Symbols and Abbreviations

HE	- Higher education
SCES	- State Compulsory Education Standard
EQR	- European Qualifications Framework
NKZ	- National Classifier of Occupations
RK	- Republic of Kazakhstan
NQF	- National Qualifications Framework
NQS	- National Qualifications System
GEM	- General educational module
EP	- Educational program
GED	- General educational disciplines
CC	- Compulsory (required) component
UC	- University component
EC	- Elective component
BD	- Basic disciplines
SD	- Major disciplines
IOP	- Individual educational pathway
IQF	- Industry Qualifications Framework
PS	- Professional standard
ON	- Competencies
RO	- Learning outcome
KR	- Course work
CGW	- Calculation and graphic work
RW	- Scientific research work of students
CED	- Catalog of elective disciplines

1. **Passport of Educational Program**

№	Field name	Note
1	Registration number	6B07100267
2	Education Area Code and Classification	6B07 Engineering, Manufacturing and Civil engineering
3	Code and classification of training areas	6B071 Engineering and Engineering trades
4	Educational Program Group	B067 Air transport and technologies
5	Name of the educational program	6B07128 Aerospace engineering
6	Type of Generation Program	Current Educational Program;
7	Purpose of the Educational Program	Training of highly qualified personnel in the field of space engineering and who have theoretical and practical knowledge, skills and skills in the study of processes and spacecraft of space systems, design and implementation of technical projects, systematic solution of problems using innovative approaches, construction of concepts and strategies of activities that meet the needs of domestic and world markets of intellectual labor, ready to make a qualitative breakthrough in the development of astronomy, cosmophysics and cosmonautics.
8	ISCED Level	ISCED 6 Bachelor's degree or equivalent
9	National Qualifications Framework Level	6
10	Level by Industry Qualification Frame	6
11	Distinctive features of the Educational Program	no
	Partner Institution of Higher Education	no
12	List of competencies	The competencies to be formed are presented in **Appendix 3**
13	Training results	ON-1. Communicate effectively orally and in writing, including in a foreign language, in a professional environment and society, form and reasonedly defend one's own point of view, ideological and civic position in interpersonal interaction and an intercultural environment, observe anti-corruption ethics. ON-2. Demonstrate and apply basic mathematical, natural science, humanities, socio-economic and legal knowledge in an interdisciplinary context to solve engineering problems in the professional field. ON-3. Possess the basics of economic knowledge, have a scientific understanding of management, marketing, finance, know and understand the goals and methods of government regulation of the economy, the role of the public sector in the economy. ON-4. Demonstrate the ability for self-organization, self-education and professional improvement, critical reflection of accumulated experience. Know the methods

		and methods of planning and organizing production and compliance with safety, labor protection and environmental regulations. Demonstrate the ability to apply the rules and regulations of industrial and environmental safety, industrial sanitation, fire safety and labor protection. ON-5. Use various types of information and communication technologies in professional activities: Internet resources, cloud and mobile services for searching, storing, processing, protecting and distributing information ON-6. Demonstrate basic knowledge in the field of special disciplines and a willingness to use the acquired knowledge in professional activities, apply methods of mathematical analysis and modeling, theoretical and experimental research. ON-7. Demonstrate the ability to acquire new, expand and deepen previously acquired knowledge, skills and competencies in various areas of life, necessary for successful implementation in the field of professional activity, including at the intersection of different areas of activity and fields of science. ON-8. Know the methods of design, engineering analysis, assembly, integration, testing and production of spacecraft and/or complex technical products, principles of project implementation for the creation of CT, sequence and stages, basics of the structure of spacecraft and spacecraft, basics of designing complex systems, methods of automated design. Be able to carry out computer modeling, calculations using general and special-purpose software for design, preliminary calculations using the analytical method, carry out design and engineering work in accordance with the technical specifications, use specialized reference materials. ON-9. Have knowledge of orbital mechanics, spacecraft flight control principles, spacecraft flight dynamics, radio engineering, electronics and telecommunications, navigation and orientation systems, spacecraft state monitoring and control. Know the operating principles of satellite systems and sensors, satellite data formats, the basics of photogrammetric processing of remote sensing data, methods of geospatial data analysis; standards and regulations in the field of remote sensing data processing and analysis, typical faults and diagnostic methods for hardware and software components. Be able to monitor spacecraft orbital parameters and predict orbits, perform calculations to perform an orbital maneuver to maintain spacecraft orbital parameters and in the event of a possible collision with other objects; apply methods of mathematical modeling and analysis when assessing the

		quality of remote sensing data, perform geometric and radiometric correction of images, create databases of space images. ON 10. Know about different types of engines, including aircraft, rocket, liquid propellant, ion plasma, and solid propellant engines, and be able to analyze and select the most appropriate engines for various missions. Master the skills of synthesis and parameter estimation. ON 11. Possess an understanding of intelligent robotic systems, space missions and astroinformatics. Also be able to effectively synthesize innovative solutions for the implementation of space projects. Systematically analyze complex problems, highlight key aspects, and provide critical assessment in the design and implementation of space missions. ON 12. Know the rules for the creation and operation (use) of space rocket complexes on the territory of the Republic of Kazakhstan, the rules for the disposal of space objects and technical means decommissioned; the composition, purpose, structure, general characteristics, technical condition and rules for the operation of technological equipment of the ground-based space infrastructure; types of technical maintenance, repair and preventive work on technological equipment, technical systems and units. Be able to work with regulatory technical and operational documentation, diagrams and drawings for technological equipment, technical systems and units; work with modern systems for monitoring and controlling their technical condition, assessing the technical condition, searching for and promptly eliminating faults.
14	Form of education	Full - time
15	Language of instruction	Russian, Kazakh, English
16	Volume of loans	240
17	Academic degree awarded	Bachelor of Engineering and Technology
18	Availability of an appendix to the license for the direction of training	No. KZ80LAA00018161 dated 05 May 2020
19	Availability of accreditation of the Educational Program	There is
	Name of the accreditation organization	Independent Kazakhstan Agency for Quality Assurance in Education, Independent Accreditation and Rating Agency (IAAR)
	Validity period of accreditation	31.05.2024-30.05.2027
20	Information about disciplines	Information about the disciplines of the CC, UC, EC are presented in **Appendix 1**
20	Field of professional activity	Civil and defense aerospace sector; aircraft and rocket-space engineering; design bureaus and engineering centers; ground-based space infrastructure (mission control center, tracking stations); companies in the field

		of satellite communications, GNSS and geomonitoring; startups in the field of drones, CubeSat and New Space.
21	Types of professional activity	Development, modeling and design of aerospace products and their components; organization and support of processes of production, assembly and testing of aircraft; technical maintenance, diagnostics, reliability control and resource management of aerospace systems; analysis of characteristics and behavior of aerospace systems using computational and experimental methods; conducting applied and fundamental research in the field of aerodynamics, flight dynamics, structures and control systems.
22	Modular curriculum	Given in **Appendix 2**

2. Matrix of correlation of learning outcomes for the educational program as a whole with the developed competencies

No.	Name of disciplines	ON1	ON2	ON3	ON4	ON5	ON6	ON7	ON8	ON9	ON10	ON11	ON12
1	History of Kazakhstan	v											
2	Kazakh (Russian) language	v											
3	Foreing language 1	v											
4	Physical training	v											
5	Information and communication technologies					v							
6	The module of socio-political knowledge (cultural studies, psychology)	v											
7	Philosophy	v											
8	Module of socio-political knowledge (sociology, political science)	v											
9	Economics and law, entrepreneurship and financial literacy		v	v									
10	Calculus I		v										
11	Calculus II		v										
12	Physics 1		v										
13	Physics 2		v										
14	Basics of Computer Graphics						v		v				
15	Linear Algebra		v										
16	Mechanics						v	v	v				
17	Strength calculations of structural elements						v		v				
18	Artificial intelligence					v						v	
19	Big Data Basics					v				v			
20	Fundamentals of scientific research and academic writing					v		v					

21	Probability theory and elements of mathematical statistics		v					v					
22	Electrical engineering and fundamentals of electronics						v	v		v			
23	Metrology, standardization and certification				v		v						v
24	Sustainable Development: Ethics, Inclusion and Safety	v	v										
25	Bases of algorithmization and programming					v		v					
26	Modern programming technologies												
27	Aplied theory of information					v		v					
28	Chemistry / Chemistry of energy-intensive materials		v										
29	Introduction to Aerospace Engineering							v	v				v
30	Spacecraft								v	v			
31	Fundamentals of Space Communications and Navigation							v		v			
32	Space Materials Science						v		v				
33	CAD/CAM/CAE design in space applications						v		v			v	
34	Reliability of Spacecraft Systems								v	v	v		
35	Testing of Aerospace Equipment				v				v				v
36	Automatic Control Systems in Spacecraft							v	v	v			
37	Design of stabilization and guidance systems						v		v	v			
38	Design and Operation of Ground Space Systems								v			v	v
39	Ballistics / Aerodynamics						v		v	v			

40	The application of gyroscopes in Space Technology / Remote Sensing of the Earth and Space Monitoring						v		v	v			
41	Methods of satellite data processing / Rocket Propellants				v		v			v	v		
42	Unmanned aerial vehicles / Parts of devices and instrument making technologies						v		v				
43	Rocket Engines / Aviation (air-jet) engines				v		v				v		
44	Microprocessors in space radio engineering and digital control systems / Intelligent robotic systems for space exploration							v	v			v	
45	Industrial practice				v	v		v					v
46	Pre-diploma training				v	v		v					v