NON-PROFIT JOINT STOCK COMPANY
"ALMATY UNIVERSITY OF POWER ENGINEERING AND TELECOMMUNICATIONS NAMED AFTER GUMARBEK DAUKEYEV"

Approving
Vice Rector for Science
Alipbayev K.A.
"_____" 2026 y.

PROGRAM

Entrance examination to the doctoral program in the direction

8D07105 – Space Engineering and Technology

Almaty 2026

The program is compiled in accordance with the Technical Specification for the formation of a database of examination materials for entrance exams to doctoral studies in groups of educational programs (MES RK) with taking into account the Modular curriculum of the educational program 8D07105 – Space Engineering and Technology.

This program sets out the requirements for a mandatory minimum of knowledge for admission to doctoral studies and the level of applicants to doctoral studies.

The program was reviewed and approved at the meeting of the AEE Department. Protocol no. 9 from "19" 05 2026 y.

Head of the AEE Department _____ Y. Nurgizat

The program was approved at a meeting of the educational and methodological commission of the Institute of Telecommunications and Automation.

Protocol no. 10 from 15.05 2026 y.

Director of the ITA _____ A. O. Omarbekova

The program of the entrance exam for doctoral studies in the educational program 8D07105 – Space Engineering and Technology has been coordinated with the Department of Science of the AUPET named after G.Daukeev.

Director of the Department of Science _____ Kalyeva N.B.

The program of the entrance exam for doctoral studies in the educational program 8D07105 – Space Engineering and Technology has been coordinated with the Department of Academic Affairs of the AUPET named after G.Daukeev.

Director of the Department of Academic Affairs _____ Baizakova S.M.

I. General Provisions

1. The program has been compiled in accordance with Order No. 600 of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018, "On Approval of the Standard Rules for Admission to Educational Institutions Implementing Higher and Postgraduate Education Programs" (hereinafter referred to as the Standard Rules), as amended.
2. The entrance examination for doctoral studies includes an interview, an essay, and an exam on the educational program group profile.

Block	Points
1. Interview	30
2. Essay	20
3. Exam on the educational program group profile	50
Total/passing	100/75

3. The entrance examination lasts 3 hours and 10 minutes, during which the applicant writes an essay and answers the electronic examination ticket. The interview is conducted at the university prior to the entrance examination.

II. Entrance Exam Procedure

1. Applicants to the doctoral program 8D07105 – Space Engineering and Technology write a problem-based/thematic essay. The essay must be at least 250 words long.

The essay's purpose is to determine the applicant's level of analytical and creative abilities, as expressed in the ability to construct their own arguments based on theoretical knowledge, social experience, and personal experience.

Essay Types:

- A motivational essay outlining the motivations for research;
- A scientific and analytical essay justifying the relevance and methodology of the planned study;
- A problem-based/thematic essay reflecting various aspects of scientific knowledge in the subject area.

2. The electronic examination form consists of three questions.

1. Scientific and Technical Issues in Space Technology and Engineering

1.1 Current State of the Space Industry in Kazakhstan

Key infrastructure elements of the space economy within the implementation of the national program. Requirements for the quality and efficiency of space systems. Principles for creating favorable conditions for the development of the space technology and engineering market. The role and significance of the industry as an element of the infrastructure of the Republic of Kazakhstan.

1.2 Prospects for the Development of Space Flights

Overview of current and future space missions. Technological challenges and innovations in space flights. The role and importance of manned and unmanned missions.

1.3 Issues in Telemetry and Control of Spacecraft

Modern telemetry methods. Challenges of long-distance data transmission. Methods to improve the efficiency of spacecraft control.

1.4 Development and Use of Nanosatellites

Advantages and challenges in nanosatellite development. Examples of successful missions. Prospects for the use of nanosatellites for scientific and commercial purposes.

1.5 The Role of Artificial Intelligence in Space Technology

Application of AI in spacecraft. Tasks solved by AI in space. Problems and future directions in AI research for space missions.

1.6 Development and Testing of Space Propulsion Systems

Modern methods for developing space propulsion systems. Challenges in testing and ensuring reliability. Prospects for propulsion system development for interplanetary flights.

1.7 Modern Methods of Planet and Satellite Exploration

Technologies for studying planetary surfaces and atmospheres. Examples of current and planned missions. Challenges and opportunities in the study of planets and their moons.

1.8 Advantages and Disadvantages of Satellite Communication Systems

Definition and principles of satellite communication systems. Classification, strengths and weaknesses. Methods for improving signal quality and maintaining continuous communication.

1.9 Challenges and Prospects in Orbital Mechanics

Analysis of current issues and challenges in orbital mechanics. Methods for orbit calculation and correction. Prospects for the improvement of orbital mechanics for future missions.

1.10 Innovations in Heat Exchange and Thermal Insulation of Spacecraft

Modern thermal control methods in spacecraft. Issues and solutions in thermal insulation. Future directions in technology development for reliable thermal regulation in space.

1.11 Development of Optical Systems in Space Technology

Current state and development prospects of optical systems for data transmission in space. Advantages and disadvantages of optical communication lines for space missions. Major scientific and technological challenges in this field.

Recommended Reading List

1. Ivanov, A.V. *Fundamentals of Orbital Mechanics*. – Moscow: Nauka, 2020.
2. Petrov, S.B., Kuznetsov, V.N. *Heat Exchange and Thermal Insulation of Spacecraft*. – St. Petersburg: Piter, 2019.
3. Ivanov, A.V. *Fundamentals of Orbital Mechanics*. – Moscow: Nauka, 2020.
4. Petrov, S.B., Kuznetsov, V.N. *Heat Exchange and Thermal Insulation of Spacecraft*. – St. Petersburg: Piter, 2019.
5. Sidorov, I.G. *Modern Satellite Communication Technologies*. – Novosibirsk: Siberian University Press, 2018.
6. Vasiliev, R.D. *Cloud Computing and Its Applications in Space Technology*. – Kazan: Kazan University, 2021.
7. Chernov, A.P. *Innovations in the Space Industry*. – Yekaterinburg: Ural Branch of the Russian Academy of Sciences, 2017.
8. Smith, J. *Fundamentals of Space Technologies*. – London: SpaceTech Publishing, 2016.
9. Kim, E.N. *Automated Spacecraft Control Systems*. – Moscow: Mashinostroenie, 2020.
10. Petrov, L.M. *Latest Developments in Space Propulsion Systems*. – Minsk: Belarusian State University, 2019.