«APPROVED»
Member of the Board – Vice Rector for Academic Affairs
NJC «Al-Farabi KazNU»
_____Kazmagambetov A.G.
«___» _____ 2025

The program of
the entrance exam for the group of educational programs of the Faculty of Physics and Technology faculty
Master's degree
for foreign citizens to study on a paid basis

1. General Provisions

1.1 The program was drawn up in accordance with the Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018, No. 600 «On approval of the Model Regulations for admission to studies in educational organization, implementing educational programs of technical and vocational education» (hereinafter – the Standard Rules).

1.2. Kazakh National University named after al-Farabi accepts individuals who have completed higher education programs for postgraduate education programs (master's degree).

1.3. Entrance exams are conducted in the form of interviews for the following educational programs:

- ✓ 7M01501 – Physics
- ✓ 7M05308 – Physics
- ✓ 7M05303 – Physics (PFUR)
- ✓ 7M05315 – Plasma Physics (MEPHi)
- ✓ 7M05310 – Physics and Astronomy
- ✓ 7M05304 – Technical physics
- ✓ 7M05305 – Technical physics (ITMO University)
- ✓ 7M05306 – Technical physics (TPU)
- ✓ 7M05312 – Nuclear physics
- ✓ 7M05311 – Nuclear medicine
- ✓ 7M05317 – Nuclear medicine (MEPHi)
- ✓ 7M05316 – Theoretical nuclear physics (MEPHi)
- ✓ 7M07134 – Applied physics and electrical engineering
- ✓ 7M06201 – Radioengineering, electronics and telecommunications
- ✓ 7M07109 – Thermal power engineering
- ✓ 7M07130 – Thermal power engineering (MEPHi)
- ✓ 7M07112 – Electric Power Engineering
- ✓ 7M07111 – Management in Electric Power Engineering (MPEI)
- ✓ 7M07116 – Materials science and technology of new materials
- ✓ 7M07120 – Nanomaterials and nanotechnology

- ✓ 7M07125 – Electronics and control systems
- ✓ 7M07501 – Standardization and certification (by industry)
- ✓ 7M07503 – Metrology
- ✓ 7M07124 – Solar Energy Engineering
- ✓ 7M07135 – Materials science and engineering (NPU, China)
- ✓ 7M06203 – Electronics and communication technologies (NPU, China)

1.4. For the organization and conduct of entrance exams for the admission of foreign applicants, an examination subject commission for the academic year is established by the rector of al-Farabi Kazakh National University.

The examination commission for the admission exams of foreign applicants to KazNU includes employees of the Office of Internationalization and Recruitment (hereinafter referred to as the Office) and the teaching staff of KazNU.

1.5. If a foreign applicant who meets the above-mentioned requirements is unable to come to the University for the entrance interview, they have the option to take it in an online format.

1.6. Entrance exams in the form of oral interviews for the admission of foreign applicants are evaluated on a 100-point scale. For admission to the master's program on a fee-paying basis, a minimum of 75 points is required for the academic and pedagogical track (2 years) and a minimum of 50 points for the specialized track (1-1.5 years).

1.7. Following the entrance interview, a protocol is prepared in the established format. The interview protocol is signed electronically via the "Salem office" system by the chairperson and all attending members of the commission and then submitted to the Office.

1.8. The decision on admission is reviewed by the competition commission for the enrollment of foreign applicants and documented by a protocol through the "Salem office" system. The results of the entrance exam are announced on the day of the exam.

1.9. Retaking the entrance exam is not allowed.

1.10. Appeals regarding the results of the interview are allowed within 24 hours.

2. Conducting the entrance exam in 2025:

2.1 The interview is conducted in Russian, Kazakh, and English languages. The oral interview also includes questions aimed at assessing the applicant's ability to learn, creative activity, critical thinking, and personal qualities.

2.2. An indicative list of interview topics:

1. The emergence of science. Science as a sociocultural phenomenon. The role and functions of science in society.
2. Three facets of science: science as knowledge, science as a form of activity and science as a social institution.
3. The structure of scientific knowledge. Scientific knowledge as a complex evolving system. Logic and methodology of scientific research.
4. The concept, essence, types of scientific research. Forms and research methods. Classification of scientific research. The essence of fundamental and applied research.

Research levels.

5. Scientific traditions and scientific revolutions. Types of scientific rationality.

6. The essence of scientific revolutions and their structure. Classical and non-classical science: the main principles and paradigm shifts.

7. Modern post-non-classical science: structure, signs, criteria. New research strategies.

8. Interdisciplinarity and principles of synergetics. The main trends in the integration and differentiation of science.

9. Science as a social institution. Norms and values of the scientific community.

10. The modern system of organization and management of scientific research in the Republic of Kazakhstan and in the world. Ethical aspects of science at the beginning of the 21st century and humanitarian control in science.

11. Current topical methodological, methodological, and philosophical problems of the natural and social sciences, as well as special branches of scientific knowledge in accordance with the specialization of master's training.

12. The dynamics of classical fields. The Klein-Gordon equation. Maxwell's Equations.

13. The symmetry in physics. Lorentz invariance.

14. Quantization of free fields.

15. Propagators in quantum field theory.

16. Quantization of interacting fields in quantum field theory.

17. The Dirac equation.

18. Quantizing the Dirac Field.

19. The action in classical and quantum field theories.

20. The Feynman path integral in quantum field theory.

2.3. Recommended reading list for preparation:

1. Cover, J.A., Curd, M. and Pincock, C. Philosophy of Science: The Central Issues, 2nd edition. Norton. – 2012.

2. Gauch H.G. Scientific Method in Practice. - Cambridge University Press, 2002.

3. Graduate student of the university: technology of scientific work and educational activities / Reznik SD 2nd ed., Rev. and enlarged. - Moscow: INFRA-M, 2011.

4. Altaev Zh. A., Baitenova N. Zh. History and philosophy of science. - Almaty: Rarity 2009.

5. Baturin V. K. Philosophy of science: a textbook. - M., 2012.

6. The Law of the Republic of Kazakhstan «On Science».

7. History and philosophy of science. Edited by Yu. V. Kryanev. M., 2011

8. Kaudyrov T. E. Intellectual property law in the Republic of Kazakhstan, Almaty: Zheti zhargy, 1999-68c.

9. Kohanovsky V. P., Leshkevich T. B. Philosophy of science in questions and answers. Rostov-on-Don, 2006.

10. Lakatos I. Falsification and methodology of research programs. Moscow, 1995.

11. Maidanov A. S. Methodology of scientific creativity -. M., 2009

12. Ostrovsky E. V. History and Philosophy of Science. - M., 2012

13. Petrova V. F., Khasanov M. Sh. Philosophy of scientific cognition. - Almaty. - 2015.

14. Popper K. Logic and the growth of scientific knowledge. - M.: Progress, 1983.

15. Stepin V. S. History and philosophy of science – - M.: Academic Project, 2011 – - 423 p.

16. Thomas Kuhn. The structure of scientific revolutions. - M.: AST Publishing house, 2001.

17. Torosyan V. G. History and philosophy of science: textbook for universities — - M., 2012.

18. Feyerabend P. Selected works on the methodology of science. M.; Progress, 1986.

19. Khasanov M. Sh., Petrova V. F. History, and philosophy of science. Almaty, Kazak Universities, 2013.

20. Pierre Ramon, Field theory. A modern primer. Westview, 1984, P.329.

21. David Tong, Quantum Field Theory, Department of Applied Mathematics and Theoretical Physics, Centre for Mathematical Sciences, Wilberforce Road, Cambridge, CB3 OWA, UK. http://www.damtp.cam.ac.uk/user/tong/qft.html.

22. Warren Siegel, FIELDS, C. N. Yang Institute for Theoretical Physics, State University of New York at Stony Brook, Stony Brook, New York 11794-3840, USA, http://insti.physics.sunysb.edu/~siegel/plan.html

23. Methods of scientific cognition. - Almaty: Gylym, 1996.

24. Ian J R Aitchison, Anthony J G Hey, "Gauge theories in particle physics. A practical introduction third edition", IOP Publishing Ltd 2003.

25. Eberhard Zeidler, Quantum Field Theory III: Gauge Theory. A Bridge between Mathematicians and Physicists, Springer-Verlag Berlin Heidelberg 2011.

26. Modern Philosophy of Science. Anthology / Compiled by A. A. Pechenkin. - M., 1996.

27. Stepin V. S. Philosophy of Science. General problems. M., 2010.

28. Stepin V. S., Gorokhov V. G., Rozov M. A. Philosophy of science and technology. - M, 1996.

29. Tyapin I. N. Philosophical problems of technical sciences: textbook M., 2014.

30. Philosophy and methodology of science. For postgraduates and undergraduates / Edited by K. H. Rakhmatullin and others-Almaty, 1999.

31. Holton J. Thematic analysis of science. Moscow, 2001Cover, J.A., Curd, M. and Pincock, C. Philosophy of Science: The Central Issues, 2nd edition. Norton. – 2012.

3. Scale and criteria for evaluating the entrance exam for admission to the master's program (specialized track) for foreign citizens on a fee-paying basis:

Number of points	Compliance criteria
90-100 points «Excellent»	All competencies required for the entrance exam have been mastered. A comprehensive answer has been provided to two theoretical questions: - Scientific terminology has been correctly utilized. - All necessary features, elements, grounds, and classifications have been accurately named and defined to substantiate the arguments. - The main viewpoints accepted in scientific literature regarding the discussed issue have been indicated.

	- Own position or viewpoint has been argued, and the most significant research problems in this field have been identified. - The practical problem has been solved correctly with all necessary explanations.
75-89 points «Good»	All competencies required for the entrance exam have been mastered. A correct answer has been provided to two theoretical questions, with minor deficiencies identified in preparation: Scientific terminology is applied. - All necessary features, elements, classifications are named, but there is an error or inaccuracy in the definitions or concepts. - There are shortcomings in argumentation, factual or terminological inaccuracies are present, but they are not significant. - Some insights into possible research problems in the field are expressed. - The practical problem is partially solved with incomplete explanations provided.
50-74 points «Satisfactory»	All competencies required for the entrance exam have been mastered. A correct answer has been provided to two theoretical questions, with minor deficiencies identified in preparation: - Only some grounds, features, characteristics of the phenomenon under consideration are named and defined. - Significant terminological inaccuracies are present. - Own viewpoint is not presented. - No insights into possible research problems in the field are provided. - The practical problem is not solved.
0–49 points «Unsatisfactory»	Not all competencies required for the entrance exam have been mastered. Incorrect answers are provided to two theoretical questions, with significant deficiencies identified in preparation. The practical problem is not solved.

3.1 Scale and assessment criteria of the entrance examination for admission to the master's program (academic and pedagogical direction) for foreign citizens on a fee-paying basis:

Number of points	Compliance criteria
90–100 points "Excellent"	Demonstrates knowledge of the fundamental processes within the studied subject area; depth and completeness of addressing the issue; logically and sequentially expresses own opinion on the discussed problem; possesses conceptual-categorical framework, scientific terminology; logical coherence of the answer, adherence to the norms of contemporary scientific language.
80–89 points "Good"	Competent use of scientific terminology; mastery of conceptual-categorical framework; problem-oriented presentation of

	formulated questions; occasional errors in presenting factual material; incompleteness in presenting scientifically established facts within the scope of questions; logical coherence of the answer, adherence to the norms of contemporary scientific language.
75–79 points "Satisfactory"	Insufficient use of scientific terminology; inadequate mastery of conceptual-categorical framework; ability to address only one of the problems formulated in the questions; errors in presenting factual material; superficial knowledge of the subject area; violation of logical coherence in the answer, norms of contemporary scientific language.
0–74 points "Unsatisfactory"	Absence of necessary scientific terminology in the answers; descriptive presentation of discussed issues, inability to identify and present problems; gross errors in presenting factual material; lack of knowledge of historiography of the studied subject area.