The program of
the entrance exam for the group of educational programs of the Faculty of
Information Technology for 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:
- ✓ 7M06102 – Information systems
- ✓ 7M06103 – Computer Engineering
- ✓ 7M06104 – Computer Science
- ✓ 7M06301 – Information security systems
- ✓ 7M07113 – Business Analytics and Big Data
- ✓ 7M07128 – Intelligent control systems

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. Based on the results of the entrance exam, an interview protocol is drawn up in the established form. The interview protocol is signed through the "Salem office" system by the chairman and all present members of the commission and transferred to the DIR.

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 2024:

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. Language alphabet
2. Rules for writing the main objects of the language
3. Data types
4. Constants
5. Organization of algorithms in a circular structure
6. Data models
7. DBMS classification
8. Relational data model
9. Relational algebra
10. Relational algebra operations: union, intersection
11. Description of linear and branching structures of algorithms
12. Arithmetic and Boolean Expressions
13. Classification of Algorithmic Language Operators
14. Assignment operator
15. Control operators
16. Organization of data input-output
17. E/R data model, entities
18. The concept of functional dependency and the process of extracting a primary key from a candidate key
19. SQL Aggregate Functions
20. Filtering and searching data in the database
21. Sorting and grouping of SQL query results.
22. Programming of cyclic structures of algorithms (by examples of problems of numerical analysis, processing of numerical arrays, problems of ordering the components of arrays)
23. Sorting and Searching Algorithms
24. Estimating the complexity of algorithms.
25. Linear data structures
26. Hash table performance
27. Naive binary tree
28. Fetching data from one and several tables (SQL)
29. Interactive mode of work with the database.
30. Using SQL to Modify Data
31. Numerical sequences. In this topic, the concept of a numerical sequence is introduced, arithmetic operations on them are studied, bounded and unbounded sequences, infinitely large and infinitely small sequences, convergent sequences, and their basic properties are considered.
32. A function of a single variable. This topic introduces the concept of a function of one

variable, the concept of the limit of a function; theorems about the limits of functions are proved; infinitesimal and infinitely large functions are considered.

33. The concept of continuity of functions. In this topic, the concept of continuity of functions is introduced, arithmetic functions over continuous functions are studied; the continuity of elementary functions; properties of continuous functions, the concept of uniform continuity of functions.

34. Differentiation of a function of one variable. This topic introduces the concept of a derivative function, its geometric and physical meaning, the concept of differentiability at a given point; the rules for differentiating the sum, difference, product and quotient are studied; the rules for differentiating a complex function; derivatives and differentials of higher orders.

35. Indefinite integral. This topic introduces the concept of a primitive function, the definition of an indefinite integral, studies the basic properties of an indefinite integral, the method of integration in parts; integration of rational functions, integration of trigonometric functions.

36. Draw a diagram for connecting a 12-volt incandescent lamp from a 12-volt constant power supply with a switch and variable resistance. Use this example to analyze Ohm's and Kirchhoff's laws for linear DC electric circuits.

37. Draw an ammeter connection diagram for an electric circuit consisting of an emf, a resistor and an incandescent lamp. Calculate the load current on the incandescent lamp.

38. Analyze the current characteristics of a circuit with a series connection of three resistors and calculate using the loop currents, nodal potentials.

39. Draw a diagram for connecting two-phase AC circuits of an incandescent lamp with a power of 200 watts at 220 volts, an iron with a power of 1000 watts and determine the currents consumed by these current consumers.

40. The concept of volt-ampere characteristics of DC and AC circuits. The device is a multimeter and an alternating current phase probe, methods for measuring and diagnosing electrical circuits.

2.3. Recommended reading list for preparation:

1. Boyarsky M.N. World history / M.N. Boyarsky. – M.: AST, 2010. – 352 p. Vasil, L.S. Universal history. 2. East and West in the Middle of the century: Textbook / L.S. Vasil. - M.: KDU, 2018. - 538 p.

2. Vasil, L.S. Universal history. In the 6th and so on. 3. From the Middle Ages to modern times (XVI - XVIII centuries): Textbook / L.S. Vasil. - M.: KDU, 2016. - 606 p.

3. Vasil, L.S. Universal history. In the 6th and so on. 4. Novoe vremya (XIX century): Textbook / L.S. Vasil. - M.: KDU, 2016. - 680 p.

4. Vasil, L.S. Universal history. In 6-and so on. 5. From a new change for the better: General opinion / L.S. Vasil. - M.: KDU, 2015. - 680 p.

5. Vasil, L.S. Universal history. 6. The dignity and main advantages of a person: A general opinion / L.S. Vasil. - M.: KDU, 2013. - 714 p.

6. Vasil, L.S. Universal history. In the 6th volume, vol. 1. The Ancient East and antiquity: Textbook / L.S. Vasil. - M.: KDU, 2018. - 518 p.

7. Graisky, V.G. Universal history of law and judicial proceedings: Textbook for universities / V.G. Graisky. - M.: Nora, NIIGRA-M, 2015. - 816 p.

8. 11. Gadzhiev K.S., Zakaurtseva T.A., The modern history of the countries of Europe and America. XX century. At 3 o'clock / K.S. Gadzhiev, T.A. Zakaurtseva., – M.: Vlados, 2017. – 336

p

9. World history: Textbook / Edited by G.B. Polyak, A.N. Markova. - M.: Finance, 2016. - 887 p.

10. World History: Textbook / Edited by G.B. Polyak, A.N. Markova. - M.: Nauka, 2013. - 887 p.

11. World History: Textbook / Edited by G.B. Polyak, A.N. Markova. - M.: Finance, 2018. - 319 p.

12. Gubina, S.L. World history in schemes, terms, tables / S.L. Gubina. - Ph/D: Phoenix, 2015. - 318 p.

13. Gubina, S.L. World history in schemes, terms, tables / S.L. Gubina. - RnD: Phoenix 2017. - 108 p.

14. Dickey, J. The war at sea. World History / J. Dickey, M. Dougherty, F. Jestice; Translated from English by A. Kolin. - M.: Eksmo, 2011. - 248 p.

15. Jaeger, O. World History. The Middle Ages / O. Egor. - M.: AST, 2009. - 592 p.

16. Ortunov, V.V. World history in Lyrics / V.V. Ortunov. - St. Petersburg: Peter, 2013. - 560 p.

17. Hopton, R. Duel. World history / R. Opton. - M.: Eksmo, 2010. - 432 p.

18. Kravchuk Yu.B. Fundamentals of economic theory: A textbook for students of all specialties of all forms of education. Kharkiv: YUNUVD, 2014. – 341 p. http://dspace.univd.edu.ua/xmlui/bitstream/handle/123456789/378/osnovy_ekonomicheskoy_teo rii_uchebnoe_po.pdf?sequence=2&isAllowed=y

19. Sidorov V.A., Kuznetsova E.L., Bolik A.V. General economic theory: textbook for students of higher educational institutions [Electronic resource]: electronic educational publication / V.A. Sidorov, E.L. Kuznetsova, A.V. Bolik. Maikop: LLC "Elite", 2017. – System. Usage: Adobe Reader; ecgap 10'. http://201824.selcdn.ru/elit-050/pdf/9785950047947_elit-050.pdf

20. Alexandrov E.L., Kruglov V.N. World economy and international economic relations: textbook. – M.: Financial University, 2017. – 112 p. ISBN 978-5-7942-1401-7 http://elib.fa.ru/fbook/Aleksandrov_1806.pdf/download/Aleksandrov_1806.pdf?lang=en

21. Kurosh A. G., Course of higher algebra.

22. Alexandrov P.S. Lectures on analytical geometry

23. Modenov P.S., Analytical geometry. – M.: Publishing House of Moscow State University, 1969.

24. Kostrikin A.I., Introduction to algebra. Vol.1 Fundamentals of algebra. – M.: Fizmatgiz, 2001.

25. Proskuryakov I.V. Collection of problems in linear algebra. – M.: Nauka, 1978.

26. Fadeev D.K., Sominsky I.S. Collection of problems in higher algebra. – M.: Nauka, 1982.

27. Zuberbiller O.N., Tasks and exercises in analytical geometry. – M.: Nauka, 1970. V.A. Ilyin, E.G. Poznyak. Fundamentals of Mathematical analysis, parts 1, 2, 1973

28. V.A. Ilyin, V.A. Sadovnichy, B.H. Sendov. Mathematical Analysis, 1979

29. V.S. Shipachev. Higher Mathematics, 1990

30. G.N. Berman. Collection of problems on the course of mathematical analysis, 1985.

31. A.S. Solodovnikov, V.A. Babaytsev, A.V. Brailov, I.G. Shandra. Mathematics in Economics, part 2, M. 2003.

32. L.E.Elsholts. Differential equations and calculus of variations. M. 1965.

33. Schneier B. Applied cryptography. Triumph Publishing House. Moscow. 2002 //http://www.ssl.stu.neva.ru/psw/crypto.html]

34. Ross Anderson. Development of security systems. John Wiley and Sons. 2001.

35. Feistel H. Cryptography and computer privacy. Scientific American, 1973.[Russian translation: //http://www.ssl.stu.neva.ru/psw/crypto.html

36. Melnikov V. Information protection in computer systems. Moscow "Finance and Statistics". "Electron inform". 1997

37. Ivanov M.A. Cryptography. Cryptographic methods of information protection in computer systems and networks. "Kudits–image" Moscow 2001

38. Melnikov V.V. Information protection in computer systems. M., Finance and Statistics, 2003.

39. Sklyarov V.A. Programming in C and C++ languages, 1996.240 p.;

40. Boribaev B., Duisebekova K. Si tilinde programmalau: Oku-adistemelik kural. –Almaty: Kazakh University, 2007. -208 b.

41. Boribayev B. Programalau tilderine kirispe: Zhogary oku oryndaryna arnalgan okulyk . – Almaty: AESA, 2008. -376 b.

42. Kuralbayev Z.K. Algorithmdeu zhane programmalau tilderi. –Almaty: "TST-company", 2008. -354 p.

43. Podbelsky V.V., Fomin S.S. Programming in the C language. - M.: FiS, 2004. -600 p.

44. Thomas Connolly, Carolyn Begg - Databases. Design, implementation and maintenance. Theory and Practice 3rd edition, Moscow, Williams, 2003, 1440 p

. 45. Rebecca M. Riordan - Fundamentals of relational databases. Basic course. Theory and practice. Moscow, Russian Edition, 2001, 384 pages

46. Mayer D. Theory of relational databases. M., Mir, 1987.

47. Boyko V.V., Savinkov V.M. Designing databases and information systems. –M.: Finance and Statistics, 1989.

48. Dieter Gollmann, Computer security, John Wiley, 1999.

49. Ross Anderson. Development of security systems. John Wiley and Sons. 2001

50. Bruce Schneier. Applied cryptography.2nd ed. John Wiley & Sons (1996). [Russian translation: http://www.ssl.stu.neva.ru/psw/crypto.html

51. Sh. Musiralieva. Applied cryptography. Almaty. 2012

52. Joan Dain, Vincent Ryman, Rijndael Design, 2002

53. Petrovas, R. Rinkeviciene. Theory of automatic control I, II: Laboratory manual. Vilnius: Technika, 2012. – 98 p.

54. Bishop R. H. Analysis and design of modern control systems using Matlab. Prentice Hall, 2005. – 1018 p.

55. Michel A. N., Hou L., Liu D. Stability of dynamic systems. Continuous, discontinuous and discrete systems, Birkhauser, 2008. 515 p.

56. Golnaragi F., Kuo B. Automatic control systems. Tenth edition. - McGraw–Hill Education, 2017. - 1160 p.

57. Zdzislav Bubnitsky Modern management theory. Springer Berlin Heidelberg New York. http://intranet.ctism.ufsm.br/gsec/livros/controltheory.pdf.

58. Bubnitsky Z. Uncertain variables and the learning process in an intelligent transportation system with production units. In: Preprints of the 5th IFAC/EURON Symposium on Intelligent Autonomous Vehicles IAV, 2004, Lisbon

59. Farid Golnaragi, Benjamin K. Kuo. Automatic control systems. 9th edition. 2010. John Wiley and Son.~. Inc. https://controltheorymaster .files.wordpress.com/2017/11/farid-golnaraghi-benjamin-c-kuo-automatic-control-systems.pdf.

60. Dale E. Seborg, Thomas F. Edgar, Duncan A. Mellichamp, Francis J. Doyle III. Process Dynamics and Management, 4th edition. John Wiley & Sons, Incorporated, 2016 – 512 p.

61. Foerster, A. Introduction to wireless sensor networks. – New York: Wiley, 2016. – 186 p.

62. Introduction to Embedded Systems: An approach to Cyberphysical Systems, by Edward Ashford Lee and Sanjit Arunkumar Seshia. Second edition. Publishing House of the Massachusetts Institute of Technology. 2016. – 568 p.

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.