Institute of Architecture and Construction named after T.K. Basenov
Department of Engineering Systems and Networks

EDUCATIONAL PROGRAM DEVELOPMENT PLAN
7M07304 "Engineering systems and networks"
for 2023-2028

Education area code and classification: **7M07 Engineering, Manufacturing and construction industries**
Training area code and classification: **7M073 Architecture and Construction**
Group of educational programs: **M127 Engineering Systems and Networks**
NQF level: **7**
IQF Level: **7**
Duration of study: **2 years**

Almaty 2023

The development plan ofthe educational program 7M07304 "Engineering Systems and Networks" was approved at the meeting of the Department of ESaN.

Protocol №1 dated August 22, 2023.

The educational program 7M07304 "Engineering systems and Networks" was developed by the Academic Committee in the field of "Architecture and Construction"

Full name	Academic degree / academic title	Position	Place of work	Signature
Chairman of the Academic Committee:				
Alimova Kulyash Kabpasovna	Candidate of Technical Sciences	Head. Department, Associate Professor	Department of Engineering Systems and Networks, IAaC named after T.K.Basenov,	
Faculty:				
Khalkhabay Bostandyk	Candidate of Technical Sciences, Associate Professor	Associate Professor	Department of Engineering Systems and Networks,	
Khoishiev Amirkhan Nurdinuly	Candidate of TechnicalSciences	Associate Professor	Department of Engineering Systems and Networks,	
Employers:				
Zhumartova Aliya Zhumartova		Director	SRC Ekozhobalau LLP	
Students				
Bayarystanov Madiyar Malikovich		Student	4th year student	

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1. Information about the educational program

Within the framework of the Master's degree, the university independently develops various educational programs in accordance with the National Qualification Framework, professional standards and agreed with the Dublin Descriptors and the European Qualification Framework.

Educational programs should be focused on learning outcomes.

Dublin descriptors, which describe the level and scope of knowledge, skills, abilities and competencies acquired by undergraduates upon completion of the educational program at each level (stage) of higher and postgraduate education, are based on learning outcomes, competencies formed, as well as the total number of ECTS credit (credit) units. The structure of the master's degree program is formed from various types of academic and scientific work that determine the content of education, and reflects their correlation, measurement and accounting.

The aim of the educational program is to achieve the provision of high-quality educational services in the field of postgraduate education, leadership in the national space for training personnel in the specialty 7M07304 "Engineering Systems and Networks" through the implementation of the principles of the Bologna Process and modern quality standards.

The purpose of the educational program is to train highly qualified and competent specialists in the construction and engineering sector of the economy of the Republic of Kazakhstan, who are able to quickly adapt to rapidly changing market conditions and innovative trends.

The list of elective component disciplines is determined by the university independently. This takes into account the expectations of employers and the needs of the labor market. Masters of the specialty 7M07304 "Engineering systems and networks" can perform the following types of professional activities:

- Calculation and design and technical and economic information;
- organizational and managerial;
- production, technological and operational;
- legal, expert and consulting - research activities;
- educational (pedagogical).

Specific types of activities are determined by the content of the educational and professional program developed by the university. *Organizational and managerial activities:*

- organization of the work of the labor collective of performers with the creation of the necessary conditions, equipping (providing) production with labor and material resources, making optimal management decisions in various production conditions;
- finding optimal solutions in case of labor disputes on staffing, wages, cost and quality of various types of work, ensuring life safety, labor protection and compliance with environmental safety in production areas;
- assessment of production and non-production costs to ensure the quality of construction and repair products;
- implementation of technical control and quality management in transport construction.

Production, technological and operational activities:

- planning and solving technological problems encountered in the production process;
- efficient use of materials and raw materials, equipment, machinery, modern computer programs for calculating and designing parameters of technological processes;
- engineering and technical operation of buildings and structures of industrial and civil construction or engineering systems.

Scientific, experimental and research activities:

- implementation of fundamental and applied scientific research in the study of engineering systems;
- creation of new production technologies;
- performing development work;
- analysis of the state and dynamics of business objects using modern methods and methods;
- production of scientifically based experimental studies of engineering systems;

Legal, expert and consulting activities:

- possess basic knowledge in the field of civil, financial, commercial and other branches of law;
- ability to navigate the current legislation and the ability to apply certain legal norms in practice;
- conducting expertise and providing consulting assistance in various production situations.

Educational (pedagogical) activities:

- knowledge of the functions of teaching courses in basic disciplines, technology, organization, planning and management of engineering systems, performing academic work as a teacher (teacher) in institutions of secondary and professional education (schools, gymnasiums, lyceums, colleges).

The purpose of the EP: The goal of the educational program is to achieve the provision of high-quality educational services in the field of postgraduate education, leadership in the national space for training personnel under the educational program 7M07304 " Engineering Systems and Networks "(scientific and pedagogical direction) through the implementation of the principles of the Bologna process and modern quality standards.

Objectives of the OP: training of highly qualified and competent specialists in the construction and engineering sector of the economy of the Republic of Kazakhstan, who are able to quickly adapt to rapidly changing market conditions and innovative trends.

The list of elective component disciplines is determined by the university independently. This takes into account the expectations of employers and the needs of the labor market.

2. Internal conditions for EP development

For the implementation of the above-mentioned educational program, the Institute and the Department of"Engineering Systems and Networks" have all the appropriate conditions: regulatory and material-technical base, methodological support, qualified personnel; organization and conduct of the educational process.

The working curriculum is developed taking into account the proportions

between the compulsory and elective components. A list of all compulsory subjects, all types of practices and other types of academic work, indicating their labor intensity in credits, is approved before the beginning of the academic year (working curriculum /zhumys oku zhospary). The procedure for developing and approving working curricula, elective subjects and their catalogs is regulated by the " Rules of Credit Technology of Training (Master's Degree)", approved by the Decision of the University Board.

In order to take into account the interests of employers in the development of educational programs, practical workers, heads of practice bases actively participate in the formation of catalogs of elective disciplines.

1. Material and technical base: modern equipped classrooms, library, computer classes, projectors, Internet resources.

At the Department of ESaN, the research base is constantly and systematically updated, improved and expanded. Students have great opportunities to perform SIS and TSIS independently..

Attaching great importance to the practical training of students, the department conducts sufficient work on the organization and conduct of professional practices, on the selection of practice bases, its methodological support, management and control.

Internship databases are selected by undergraduates, either independently, or provided by the university. The department's established practice bases are "AFF" LLP, "Almaty Su" State Communal Enterprise on REM, "SRC ECO ZHOBALAU" LLP, etc. A branch of the department has been opened on the basis of "AFF" LLP.

3. Individuality and uniqueness of the OP

The individuality and uniqueness of the educational program 7M07304 - "Engineering Systems and Networks" considers the followinge aspects:

1. Specialization: the educational program in the work curriculum provides specializations in the areas of "Heat and gas supply and ventilation" and "Water supply and Sewerage", which allows undergraduates to gain scientific knowledge in the field of engineering communication.

2. Practical orientation: Program includes list of practical exercises, and research practices, that help undergraduates master their skills навыкиin the research environment.

3. Innovative approaches: educational programs includes the study of modern calculation methods and engineering systems, the latest technologies and modern equipment, which allows undergraduatest keep abreast of current trends and innovations in the housing and communal sector of the construction industry.

4. Educational programs at the master's level, starting from the main stage of training, are aimed at the formation of highly qualified specialists who are ready for professional activity in the construction industry. The program provides in-depth knowledge and develops practical skills necessary for successful implementation of professional tasks in this field. In the course of training, students master modern methods and approaches that meet the requirements of the industry, and are prepared

to solve complex engineering and management tasks, which ensures their competitiveness in the labor market.

5. Interdisciplinarity: in the framework of the educational program, undergraduates study not only technical aspects, but also economic, environmental, social and managerial issues related to this industry. This makes it possible to form a comprehensive understanding of the problems and challenges that companies face in the construction industry, and effectively solve them in the real market. It is important that the program includes elements of scientific work, which gives undergraduates the opportunity not only to master practical skills, but also to develop their abilities for scientific research and innovative developments.

The uniqueness of the Engineering Systems and Networks educational program lies in its specialization, practical orientation, innovative approaches, professional applicability, interdisciplinary connections and scientific component. These factors make the program attractive for undergraduates and provide them with the opportunity to become highly qualified specialists in demand in the housing and communal services sector of the construction industry.

The program provides undergraduates with an opportunity to master innovative and promising technologies that contribute to the development and modernization of the housing and communal services sector. The knowledge gained within the program, as well as research and development, will always be relevant and in demand in this dynamically developing field.

4. Information about teaching staff implementing the educational program

The implementation of the educational program is provided by scientific cand pedagogical personnel who have a basic education corresponding to the specialty profile and are systematically engaged in scientific and (or)scientific and methodological activities.

Undergraduates are trained by experienced faculty members, professors, and candidates of science who have many years of teaching experience at the university.

The qualifications of teachers of the department, their quantitative and qualitative composition correspond to the areas of training of students, meet the licensing requirements and indicate the staffing of the university's educational activities. The procedure for holding a competition to fill vacant positions is regulated by regulatory documents of the Ministry of Education and Science of the Republic of Kazakhstan and internal documents (Instructions on the procedure for completing internships, preliminary training, instructing and testing knowledge on labor safety and health). The existing mechanism allows you to get a holistic view of the professional viability of the teacher, to determine its compliance with the desired position.

The competition commission conducts a qualitative analysis of the indicators of educational, methodological and research activities of the teacher, with the involvement of specialists from production to teaching, studies the characteristics from the last place of work, the motivated conclusion of the department on the applicant, the voting results of the members of the host department.

Long-term practice shows that there is a steady tendency to give competitive

preference to candidates and doctors of science who can contribute to improving the personnel potential of the university.

When applying for a teaching staff position, a mandatory condition is that the applicant has a higher professional education, a candidate or doctor of science degree, a PhD degree, a correspondence of education to the profile of university specialties, etc.

Recruitment of personnel based on the recruitment system is carried out in the following order: the staff list of teaching staff is formed; the number of vacancies for positions for training students in various educational programs is determined; a competition for filling vacant positions is announced through the media with an indication of qualification requirements; a competition is held for filling vacant positions and recommendations are made to the university rector on hiring teaching staff.

On the website of the university there is information about teachers in the educational program (https://official.satbayev.university/ru/architecture-construction/esn):

- H-index,
- professional biography,
- scientific projects,
- applications (CCFES, SCOPUS, etc.)

This information contains personal data, information about the subjects taught, academic interests of the teacher, professional development, and contact information.

5. Directions of the EP development plan, purpose, objectives, expected results, target indicators, implementation measures

The purpose of drawing up a development plan for the EP is to ensure effective management of the IEP 7M07304 "Engineering Systems and Networks".

The strategic goal of the educational program development plan is to improve and supplement the content of the educational program based on the latest innovative achievements of science and technology, taking into account the results of monitoring the demand for and employment of undergraduates. taking into account the requirements of employers, in accordance with the national development priorities of the Republic of Kazakhstan.

Tasks:

- improving and improving the conditions for obtaining a full-fledged, high-quality professional education;
- creation of prerequisites for independent research activities of a master's student at all stages of their studies;
- development of measures for mastering the work with scientific information while using domestic and foreign experience in professional activities.

Expected final results of the implementation of the development plan of the EP:

- increasing the level of demand for graduates of the EP "Engineering Systems

and Networks";

- implementation of joint educational programs with foreign partners;
- further development of the academic mobility program for teaching staff and undergraduates;
- implementation of research projects carried out within the framework of grant funding;
- increasing the level of effectiveness of scientific research and publishing activity of the teaching staff of the EP "Engineering Systems and Networks"; - further development of international cooperation;
- advanced training of teaching staff in the field of innovative training technologies.

6. Measures to reduce the impact of risks for the EP

6.1. Risk prevention action plan for the 2023-2024 academic year

Institute of Architecture and Construction

(name of the division)

Department of Engineering Systems and Networks

(name of the division)

Alimova K. K.

(Full name of the head of the structural division)

General information about risks

Name of risk	**Causes of risk**	**Probability of consequences of risk Risk**	**prevention/reduction**
measures Risk of insufficient level of training of graduates in EP	1. Non-compliance of the content of educational programs with market requirements; 2. Insufficient level of professional training of teaching staff; 3. Weak connection with practice.	Low level of employment of graduates in	1. vocational training Discussion and approval of curricula in vocational training with representatives of employers; 2. Monitoring of teaching staff passing advanced training courses; 3. Signing cooperation agreements and conducting production practices on the basis of construction and design companies.
Decrease in student enrollment	1. with insufficient career guidance work; 2. Increased competition in the field of educational services for OP; 3. Weak preparation of applicants in physics and mathematics.	Reducing the level of salaries of teaching staff by reducing the academic load of teaching	1. staff Distribution of schools to departments for career guidance; 2. Holding the Olympiad in physics and Mathematics among high school students in schools of the Republic of Kazakhstan; 3. Approval of the rules of the Olympiad in terms of providing discounts on tuition fees to winners of the subject Olympiad.
Risk of corruption component of teaching	1. staff Improper control of class attendance; 2. Non-compliance with the regulated procedure for setting, changing and reviewing grades.	1. Reputation losses; 2. Decrease in the quality of training of specialists	1. Attendance control with regular (day-to-day) issuance of passes to the electronic portal; 2. Regular (every semester) survey "Teaching staff through the eyes of students"; 3. Collective acceptance of term papers;

			4. Maximum limited access to exam materials.
Risk of publishing scientific articles in "predatory" journals	1. Insufficient information of teaching staff and doctoral students about the list of journals with a non-zero impact factor; 2. Variability of the market of services for publications in rating journals	1. Getting into the" black " lists of publishers as unscrupulous researchers; 2. Unwillingness to defend doctoral students of the department	1. Organization of close cooperation with the KazNRTU library; 2. Regular training and training seminars Elsevier, Scopus, etc
. Risk of reduced attendance of students	1. The situation with Covid	Reducing the overall level of academic	1. performance Conducting explanatory conversations with students about the benefits of vaccination of students; 2. Conducting all preventive measures in classrooms; 3. Regular quartz monitoring rooms with a large number of people.

6.2. Risk Management action Plan

Departments "Engineering Systems and Networks" for the 2023-2024 academic year

(name of the division)

Alimova K. K.

(Full name of the head of the structural division)

General information about risks

Name of the risk	Causes of the risk	Measures to eliminate the risk	Terms of execution	Mark of completion	Supporting documents
Risk of insufficient level of training of graduates in EP	1. Non-compliance of the curriculum content with market requirements; 2. Insufficient level of professional training of teaching staff; 3. Weak connection with practice.	1. Discussion and approval of training plans on OP with representatives of employers; 2. Monitoring of teaching staff passing advanced training courses; 3. Signing cooperation agreements and conducting production practices on the basis of construction and design companies.	during the year		1.WC 2023-2024, an academic year at all levels. 2. Admission to the department of teaching staff from production. Certificates of advanced training courses. 3. Opening of branches of the department.
Decrease in student enrollment	1. Insufficient career guidance; 2. Increase of competition in the field of educational services on OP; 3. Poor preparation of applicants in physics and mathematics.	1. Distribution of schools by departments for career guidance; 2. Conducting the Olympiad in physics and mathematics among high school students in schools of the Republic of Kazakhstan; 3. Approval of the rules of the Olympiad in terms of providing a discount on tuition fees to the winners of the subject Olympiad.	during the year		1. Schedule of career guidance work. 2. Holding an annual Olympiad
Risk of corruption component of academic staff	1. Improper control of class attendance; 2. Non-compliance with the regulated procedure for setting, changing and reviewing grades.	1. Control of attendance with regular (day-to-day) issuance of passes to the electronic portal; 2. Regular (every semester) survey "Teaching staff through the eyes of students";	during the year		Journals of disciplines
Risk of publishing scientific articles in" predatory " journals	1. Insufficient information of teaching staff and doctoral students about the list of journals with a non-zero impact factor; 2. Variability of the market of services for publications in rating journals	1. Organization of close cooperation with the KazNRTU Library; 2. Regular completion of trainings and training seminars by Elsevier, Scopus, etc	during the year		Bonuses for publishing articles
Risk of reducing student attendance	1. The situation with Seasonal diseases situation	1. Conducting explanatory conversations by advisors with students about the	during the year		Advisory services watch

		benefits of vaccination of students; 2. Carrying out all preventive measures in classrooms; 3. Regular quartz cleaning of rooms with a large number of people.			

7. Action plan for the development of the EP

EDUCATIONAL PROGRAM DEVELOPMENT PLAN
7M07304-Engineering Systems and Networks for 2023-202-2028 YEARS

Areas of activity	Events	Dates, academic year					Responsible	Implementation mechanism
		2023 2024	2024 2025	2025 2026	2026 2027	2027 2028		
1.Effective management of high-quality implementation of the educational program and improvement of mechanisms for managing the educational process	1. Providing the OP with regulatory documents of the Ministry of Education and Science of the Republic of Kazakhstan: internal regulatory documents (DP, Regulations, Instructions, forms)	annually	annually	annually	annually	annually	The management of the university, Head of the Department.	Formation of requests for the purchase of regulatory documents in the Ministry of Education and Science of the Republic of Kazakhstan, Work with the QMS Department of KazNRTU named after K.I.Satbayev
	2.Improvement of the OP structure	annually	annually	annually	annually	annually	The University management, Head of the Department.	Updating the content of the educational program of the specialty based on modern domestic and international experience of training in this area, the requirements of employers and the requirements of the labor market. Work with employers Monitoring the achievement of OP results.
	3. Development improvement of the modular principle of forming the EP	annually	annually	annually	annually	annually	Head of the Department.	Formation of modules taking into account the logical and content interrelation of disciplines ensuring a single methodological approach of the module. Creating content for independent work, taking into account the integrated content of the educational material.
	4. Improvement of the curriculum (updatability)	annually	annually	annually	annually	annually	Head of Department, teaching	Monitoring and analysis of employers 'needs, graduates' satisfaction. Analysis of current international experience in the direction of OP
	5. Systematic improvement of the educational and methodological support of the EP	annually	annually	annually	annually	annually	Head of the Department, Department of Academic Affairs	Updating of educational and methodological content taking into account the needs of employers, satisfaction of graduates. Advanced training of teaching

2. Training of competitive managerial personnel for the implementation of EP	1.Improvement of the EP based on the introduction of modern educational technologies and techniques into the educational process	annually	annually	annually	annually	annually	Head of the Department.	Advanced training of teaching staff. Discussion of issues related to improving the teaching methodology at the methodological seminar of the Department and the Institute. Use of interactive teaching methods
	2. Development and improvement of QED taking into account the proposals of interested parties(stakeholders), primarily taking into account the opinion of employers.	annually	annually	annually	annually	annually	Head of the Department, Department of Academic Affairs Annually	updates the MOE and WC disciplines based on the proposals of employers. Discussion at the meetings of the Department and the Academic Council of the Institute of QED with employers
	3. Expansion of practical training of students at construction and housing enterprises and research institutes of the Republic	annually	annually	annually	annually	annually	Head of the Department, Department of Academic Affairs	Conclusion of contracts on cooperation and cooperation with construction and housing enterprises and research institutes of the Republic
	4. Formation of a high-quality contingent of students	constantly	constantly	constantly	constantly	constantly	Head of the department, teaching	Career guidance plan, constant updating of the site page
3. Improving the conditions for high-quality HR support of the EP.	1. Professional development, settling down of teaching staff through training in the master's and doctoral programs of the Russian Academy of Sciences, passing internships and attracting teachers with academic degrees.	annually	annually	annually	annually	annually	Head of Department, teaching staff, management of the University	of Advanced training of teaching staff in leading foreign universities, in the CIS countries, housing and communal services enterprises.
	2. Training of own personnel at the expense of training in the doctoral program PhD	annually	annually	annually	annually	annually	Head of the Department, Department of Postgraduate Education	Employment of young specialists in graduate departments
	3. Activation of the process of teaching staff and students in external and internal academic mobility programs	2	2	2	2	2	Head of the Department, Department of Academic Affairs	Participation of teaching staff in external and internal academic mobility programs, including the Bolashak scholarship program»
	4. Involvement of professors from	annually	annually	Annually	Annually	Annually	Head of Department,	A plan to attract foreign scientists, including those from leading

	ranked foreign universities in teaching and research activities at our university.						Department of Academic Affairs Plan to attract	universities (Top 200) to teach courses and organize joint research projects.
	5. Increasing the share of retired faculty members in the department	10%	10%	10%	10%	15%	Head of the department of the Department.	Updating the staff of the faculty of the department on the basis of continuity-attracting the most competent graduates to teaching and research activities
4. Research and innovation activities in the development of the EP	1. Activation of innovative developments, R & D at the department	3	3	4	4	4	Head of the Department, teaching	Involvement of teaching staff, students in initiative state-funded and contractual research. Publication of research results in journals by the impact factor. Formation of a scientific school of leading teaching staff of the department.
	2. Participation in grant and contractual research and projects	annuall y	annuall y	annuall y	annuall y	annual ly	Head of the Department of Teaching	Increases the number of grant and contractual research, including within the framework of grant funding of the Ministry of Education and Science of the Republic of Kazakhstan.
	3. Stimulating and motivating students to actively participate in scientific activities	annuall y	annuall y	annuall y	annuall y	annual ly	Head of the Department, teaching staff, university management	Participate in student conferences, competitions of creative works. Involvement of students in performing independent scientific research. Participation in the annual Republican subject Olympiads
	4. Increase in science-metric indicators, growth of the Hirsch index (Teaching staff, PhD students).	2	2	3	3	3	Head of the Department, Teaching	Preparation of scientific publications in journals with an impact factor that are included in international scientometric databases (Thomson Reuters, Web of Science, Scopus, ScienceDirect)
5. Development of resource potential for the implementatio n of OP	1. Purchase of office equipment, scientific equipment, technical training tools, visual aids, etc	annuall y	annuall y	annuall y	annuall y	annual ly	Head of the Department, university management	Annual procurement plans
	2. Creation of a new laboratory				+		Head of the Department, university management	Annual work plans of the department. Establishment of a laboratory for heat supply, ventilation and air conditioning

	3. Purchase of new laboratory equipment	+	+	+	+	+	Head of Department, university management	Annual procurement plans
	4. Development of information and educational resources of the department (website, portal, electronic teaching materials, etc.)	annually	annually	annually	annually	annually	Head of Department, Department of Information Technologies	Events for the development of information and educational resources of the University
	5. Growth of the department's rating, teaching staff, promotion and motivation of employees.	annually	annually	annually	annually	annually	Head of Department, Teaching	Rating of teaching staff

Head of the Department
"Engineering systems and networks" **K. K. Alimova**

Discussed at the meeting of the Department "**Engineering Systems and Networks**"
Protocol №1 dated August 22, 2023