



DEVELOPMENT PLAN EP «8D07306 – Geospatial digital Engineering»

1 General Information

The doctoral educational program “8D07306 – Geospatial Digital Engineering” has been developed in accordance with the National Qualifications Framework and aligns with the Dublin Descriptors and the European Qualifications Framework. The program is aimed at training highly qualified academic and scientific-technical personnel capable of conducting fundamental and applied research, as well as implementing innovative digital solutions in the field of geospatial technologies.

The distinctiveness and competitive advantage of the program lie in the integration of fundamental physical-mathematical and engineering-technical education with practice-oriented research activities.

The program ensures the development of competencies in designing and implementing research projects, creating and analyzing spatial data, modeling complex geospatial processes, as well as designing intelligent systems for territorial and infrastructure management. Special emphasis is placed on an interdisciplinary approach, digital engineering, and sustainable territorial development under conditions of global technological change.

Through the active involvement of doctoral students in research activities, publication work, international projects, and collaboration with specialized enterprises and research centers, the program fosters skills in independent scientific work, academic leadership, and commercialization of research results.

The development plan of the educational program “8D07306 – Geospatial Digital Engineering” is aligned with the strategic priorities of the department and the university. It includes a system of performance indicators, mechanisms for monitoring the quality of training, analysis of potential risks, and tools to ensure the achievement of the planned scientific and educational outcomes.

2 Educational Program Planning

The planning and management of the educational program “8D07306 – Geospatial Digital Engineering” are carried out based on the priority directions and strategic goals of Satbayev University named after K.I. Satpayev (<https://official.satbayev.university.ru/university/mission-strategy>) and the Mining and Metallurgical Institute named after O.A. Baykonurov, reflecting the vision, mission, strategic directions, and key performance indicators of their activities (<https://official.satbayev.university.ru/mining-metallurgy>).

3 Objective of the Educational Program Development

To create, based on the integration of education and science, an effective system for training a new generation of scientific and academic personnel capable of addressing issues related to the advancement of society, the economy, industry, science, and the development of new technologies in the field of geodesy and geospatial digital engineering.

4 Objectives of the Educational Program Development

4.1 Readiness of specialists for research and project activities in the fields of geodesy, cartography, and geoinformatics, including related areas, involving the selection of appropriate research methods, modification of existing methods, and development of new methods based on the objectives of a specific study.

4.2 Readiness of specialists to develop and implement technological methods at the local level to address challenges in the field of geospatial technologies.

4.3 Readiness of specialists to search for and obtain new information necessary for solving professional tasks in the integration of knowledge within their field of activity, as well as to actively participate in the activities of an enterprise or organization.

4.4 Readiness of specialists for scientific-informational, ideological, and problem-oriented communication in professional environments and with non-specialist audiences, providing clear and well-founded justification of their position; ability to engage in organizational, managerial, and service activities, and awareness of responsibility for professional decision-making.

4.5 Readiness of specialists for self-learning and continuous professional development.

4.6 Readiness to analyze scientific publications and to present the results of their own research in writing in accordance with accepted standards in a foreign language.

4.7 Readiness to navigate modern approaches, methods, and tools of study, as well as current trends and pathways for the development of problem-solving methodologies.

5 Risks of Educational Program Implementation (SWOT Analysis)

<i>S (strength) – strong features (potentially positive internal factors)</i>	<i>W (weakness) – weak sides (potentially negative internal factors)</i>
<ol style="list-style-type: none"> 1. Recognition of the university brand and acknowledgment of the quality of training specialists in geodesy. 2. Positive image in the educational services market of the Republic of Kazakhstan. 3. Experience in applying interactive and geoinformation technologies in the educational process. 4. Use of modern information systems to ensure academic integrity. 5. Partnership relations with scientific organizations and foreign universities in the field of geodesy and cartography. 6. Developing material and technical base, modern equipment, and a high level of informatization of the educational process. 7. Expansion of classroom facilities and their equipment with modern technical tools (laser scanners, GNSS receivers, total stations). 8. Sufficient library resources, including specialized literature in geodesy and cartography. 9. Availability of educational and methodological complexes covering all disciplines of the department's educational program. 10. Stable financial position. 11. Involvement of teaching staff with experience in scientific educational activities and production. 12. Conducting classes at the department's branch facilities. 13. Increase in the quality of the department's staff through the recruitment of young and experienced specialists. 	<ol style="list-style-type: none"> 1. Insufficient volume of research work on a contractual basis in the field of geodesy. 2. Lack of licenses for certain specialized geodetic work, restricting participation in tenders. 3. Low commercialization of research results. 4. Weak collaboration network with regional universities and industrial enterprises.
<i>O (opportunity) – favorable opportunities (potentially positive external factors)</i>	<i>T (threat) – threats (potentially negative external factors)</i>
<ol style="list-style-type: none"> 1. High demand in the labor market for qualified specialists in geodesy and cartography. 2. Opportunity to introduce new courses and disciplines in modern geoinformation technologies. 3. Conducting PR events and career guidance activities among school graduates. 4. The city of Almaty as a major financial, industrial, and socio-cultural center with stable demand for geodesy specialists. 5. Openness of industrial and construction enterprises 	<ol style="list-style-type: none"> 1. Increase in the cost of modern geodetic equipment due to inflation and global economic factors. 2. Limited financial capacity of enterprises to fund research projects and contractual work. 3. Unstable level of automation in business processes and preparation of data for practical classes. 4. Weak preparation of applicants in fundamental mathematics and geography, as well

for collaboration with universities and providing student internship opportunities. 6. Demand for graduates of the accredited educational program in the labor market, including work with GIS, GNSS, and modern geodetic technologies.	as a low level of foreign language proficiency for working with international literature and software.
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Long-term action plan for the development and improvement of the educational program

	Event content	Responsible performers	Deadlines for execution
1	Study and analysis of the competitive environment; identification of the department's capabilities to enhance the image and attractiveness of the educational program for consumers (applicants, students, parents, business partners) of educational services	Head of Department, Faculty	2025–2029
2	Use of advanced marketing and digital technologies to promote distance education services	Head of Department, Faculty	2025–2029
3	Strengthening career guidance activities; attracting applicants through tripartite agreements	Directorate, Head of Department, Faculty	2025–2029
4	Involvement of faculty members from among stakeholders in the educational process	Head of Department, Faculty	2025–2029
5	Development and implementation of digital interactive learning formats; combination of theoretical and practical teaching methods and forms	Head of Department, Faculty	2025–2029
6	Preparation of the educational program for specialized accreditation in compliance with educational quality standards and agency requirements	Head of Department, Faculty	2025–2029
7	Provision of all disciplines with textbooks, teaching manuals, educational and methodological complexes with digital distance support, electronic learning	Scientific Library, Head of Department, Faculty	2025–2029
8	Development and use of case study databases and thematic educational computer programs	Head of Department, Faculty	2025–2029
9	Organization of seminars and master classes; mastering digital teaching formats with the participation of IT specialists	Head of Department, Faculty	2025–2029
10	Development of new forms of independent student work, as well as electronic assessment materials for self-evaluation	Head of Department, Faculty	2025–2029
11	Organization of seminars using student volunteer activities; seminars and master classes to improve knowledge and teaching methodology in collaboration	Head of Department, Faculty	2025–2029
12	Development of a digital rating system for assessing students' knowledge; ensuring public accessibility of grades	Academic Office, Department of Academic Affairs,	2025–2029
13	Ensuring participation of faculty and students in inter-university and international conferences, as well as competitions organized by the Ministry of Science and	Head of Department, Faculty	2025–2029

14	Development of scientific schools; integration of faculty research in teaching methodology into the educational process	Head of Department, Faculty	2025–2029
15	Effective positioning of research results in the intellectual property market	Head of Department, Faculty	2025–2029
16	Attraction of foreign scholars with a high h-index	Head of Department, Faculty	2025–2029
17	Development of the department's educational programs	Department of Academic Affairs, Head of Department	2025–2029
18	Regular professional development of faculty and students	HR Department, Head of Department	2025–2029
19	Strengthening the material and technical base	Directorate, Head of Department	2025–2029
20	Internal and external academic mobility of faculty and students	Directorate, Head of Department	2025–2029
21	Expansion of multilingual education	Directorate, Head of Department	2025–2029
22	Submission of applications for grant funding competitions for scientific and scientific-technical projects	Directorate, Head of Department, Faculty	2025–2029
23	Ensuring safe and comfortable working, learning, and extracurricular conditions for students	Directorate, Head of Department	2025–2029
24	Development of an action plan in cooperation with associations and enterprises	Directorate, Head of Department	2025–2029
25	Development of an action plan to expand external and internal mobility of students and faculty of the educational program using modern distance learning	Head of Department, Faculty	2025–2029
26	Organization of effective graduate employment activities; creation and development of an alumni community	Head of Department, Employment and Career Guidance	2025–2029
27	Formation of a fund of educational and scientific literature within the field of study	Deputy Dean for Research, Head of Department, Faculty	2025–2029
28	Equipping classrooms with new computer equipment, other technical equipment, and software	Head of Department, Faculty	2025–2029

Reviewed at the meeting of the Department of MSG Protocol № 5 dated 27.09.2025y

Head of MSG Department

Meirambek G.

Development plan of the educational program with specification of strategic planning indicators, reflecting risk analysis and assessment, implementation of activities based on identified risks, and guarantees for achieving the planned results

№	Target Indicators	Unit of Measurement	Risks					
			2025-2026	2026-2027	2027-2028	Analysis and Assessment	Strategies	Guarantees
1	Share of Graduates Employed in the First Year After Graduation	%	-	-	-	Loss of Contact with Graduates	Collaboration with Stakeholders and Business Partners. Feedback from Graduates.	Contact Information for Graduates, Business Partners, and Stakeholders. Graduate Employment. Internal Audit.
2	Number of Joint Educational Programs	Quantity	0	0	1	Analysis of the organization of the educational process in foreign universities and assessment of the possibility of creating joint educational programs (JEP)	Collaboration with national and foreign research centers, institutes, and universities. Involvement of highly qualified faculty members. To assess key indicators of learning effectiveness, develop and implement additional assessment methods. Develop an action plan for external and internal academic mobility of students and faculty.	Risk-oriented analysis (SWOT) of the implemented educational programs. Conclusion of agreements, approval and launch of educational programs, admission of students to new programs. Internal audit..

3	Number of Educational Programs Taught in English	Quantity	0	0	1	Insufficient level of English proficiency among academic staff	Organization and implementation of English language courses for academic staff at the university	Availability of international English proficiency certificates among academic staff and students. Internal audit. Semi-annual and annual departmental reports.
4	Increase in Enrollment for Distance Education	Quantity	-	-	-	Poor awareness among applicants	Intensify career guidance activities. Strengthen work on external and internal academic mobility of academic staff using modern distance learning technologies.	University digital resources. Internal audit.
5	Development and Implementation of Educational and Instructional Materials Reflecting the Results of Own Research and Best International Practices	Quantity	4	6	8	Insufficient integration of faculty research (R&D) results into the development of educational and instructional materials	Discuss at the department meeting the issues related to developing and integrating faculty research into the educational process in the field of teaching methodology, and develop methodological guidelines for the taught disciplines based on faculty research.	Faculty members with high qualifications and extensive scientific-pedagogical experience. KazNRTU Form 703-06. Annual plan for educational and methodological publications. Internal audit.

6	Share of renewal of scientific equipment as a percentage of the total number of scientific equipment, %*	Quantity	10	15	20	Increase in equipment costs due to inflationary expenses	Opening and equipping a scientific-educational laboratory for GDE	Conducting laboratory classes in accordance with the curriculum of the educational program
7	Increase in protection documents and Author's certificates*	Quantity	5	7	8	Insufficient patenting of R&D results by the teaching staff	Participation of teaching staff and students in grant funding competitions Ministry of Science and Higher Education of the Republic of Kazakhstan	Patenting of scientific developments. Patent Office
8	Number of faculty members proficient in English at a level sufficient for conducting scientific and educational activities	Quantity	4	5	6	Low level of English proficiency among senior teaching staff	Organization and implementation of English language courses at the university for senior teaching staff	Availability of international certificates confirming English proficiency among PPS and students
9	Share of faculty members holding academic degrees involved in research and in research and development (R&D) activities, %	Quantity	70	75	79	Kazakhstan's share of science funding is one of the lowest in the world (0.13% of GDP)	Increase the participation of teaching staff in grant competitions of the Ministry of Science and Higher Education of the Republic of Kazakhstan	Teaching staff with high qualifications and extensive research experience

10	Number of publications in scientific journals of the Republic of Kazakhstan recommended by COKSON of the Ministry of Education and Science of the RK	Quantity	15	18	22	Lack of or insufficient funding for research	Increase the participation of teaching staff and students in research and student research work (R&D and SRW)	TS with high qualifications and extensive experience in conducting research Published scientific articles
11	Number of ongoing research projects	Quantity	6	7	8	Kazakhstan's share of science funding is one of the lowest in the world (0.13% of GDP)	Increase participation of teaching staff in grant competitions of the Ministry of Science and Higher Education of the Republic of Kazakhstan	TS with high qualifications and extensive experience in conducting research
12	Number of research results implemented in the educational process	Quantity	6	7	8	Insufficient funding of research activities	Development and integration of R&D results into the core disciplines of the curriculum	Act of implementation of R&D results into the educational process. Open classes.
13	Number of publications in international journals indexed in Scopus / WoS	Quantity	20	23	25	Insufficient funding for research activities	Increase participation of teaching staff in grant competitions of the Ministry of Science and Higher Education of the Republic of Kazakhstan	TS with high qualifications and extensive experience in conducting research

14	Level of faculty academic degrees, %	%	75	77	79	Insufficient number of grants for training master's and doctoral students	Recruitment and employment of new staff who have successfully defended their master's and doctoral theses	Obtaining academic and scientific degrees by graduates. Internal audit.
15	Increase the proportion of faculty members and researchers who have completed professional development programs domestically and abroad	%	90	95	98	Insufficient funding	Participation of teaching staff in the "Bolashak" competition, organization of professional development courses for TS. Within the framework of the Industrial-Advisory Council for the educational program, sign a Memorandum and jointly develop with various Associations an action plan to ensure proper preparation of students for professional certification of the educational program.	Certificate of professional development. Internal audit.

Reviewed at the meeting of the Department of MSG Protocol № 1 dated 22 01, 2025y.

Head of MSG Department



Meirambek G.

