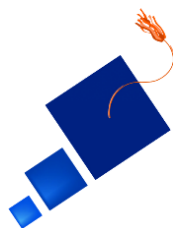


INDEPENDENT KAZAKH AGENCY FOR QUALITY ASSURANCE  
IN EDUCATION



IQAA

# THEMATIC ANALYSIS

on accreditation results of doctoral programmes in  
technical specialities

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**“Thematic Analysis on Accreditation Results of Doctoral Programmes in the Field of Humanities”**

## **Thematic Analysis on Accreditation Results of Doctoral Programmes in Technical Specialities**

(Based on the cases from Almaty Technological University - 6Д072600 – Technology and Design of Light Industry Products, 6Д072800 – Technology of Processing Industries, 6Д073300 – Technology and Design of Textile Materials, 6Д073500 – Food safety, 6Д073600 – Safety of Non-food Products and Items, 6Д070100 – Biotechnology, 6Д072400 – Technological Machines and Equipment, 6Д072700- Technology of Food Products, K.I. Satpayev Kazakh National Research Technical University – 6Д072000 – Chemical Technology of Inorganic Substances, 6Д070600 – Geology and Exploration of Mineral Deposits, 6Д070800 – Oil and Gas Business, 6Д072300 – Technical Physics, 6Д070300 – Information Systems, 6Д070400 – Computer Science and Software, 6Д070200 – Automation and Control, 6Д071000 – Material Science and Technology of New Materials, 6Д070700- Mining, 6Д071900 – Radio Engineering, Electronics and Telecommunications, 6Д073900 – Petrochemistry, 6Д075500 – Hydrogeology and Engineering Geology, 6Д073000 – Manufacture of Building Materials, Products and Structures, 6Д071800 – Power Engineering, H.A. Yassawi International Kazakh-Turkish University – 6Д070500 – Mathematical and Computer Modeling, Kazakh - British Technical University - 6Д070500 – Mathematical and Computer Modeling, 6Д070800 – Oil and Gas Business, Karaganda State Industrial University – 6Д074000 – Nanomaterials and Nanotechnologies, Auezov South Kazakhstan State University - 6Д073000 – Manufacture of Building Materials, Products and Structures, 6Д072400 – Technological Machines and Equipment, 6Д070100 – Biotechnology, 6Д072000 – Chemical Technology of Inorganic Substances, 6Д072100 – Chemical Technology of Organic Substances

### **Positive practice:**

#### **Standard 1. Aims of study programmes and policy in the field of quality assurance**

1. Improving the quality of education is built on the synthesis of the triad "science-education-innovation". Integration of research and educational activities develops on a wide range of breakthrough directions of scientific and technological progress of the oil and gas industry (K.I. Satpayev Kazakh National Research Technical University).

2. Topics for dissertations are carried out as close as possible to the real technological conditions of production and are related to the professional activities of enterprises (K.I. Satpayev Kazakh National Research Technical University).

3. The effectiveness of the objectives of the study programme is systematically assessed based on the feedback of employers - the leading enterprises of the southern region of Kazakhstan, and is revised in accordance with the latest achievements of science and technology, as well as with directions for the development of the economy of the southern region and the country as a whole. The actualization of the objectives of the study programme is carried out in the course of reviewing both normative and normative-methodological documents developed at ATU.

4. There is a system for assessing the effectiveness of the mission, goals and objectives with the participation of stakeholders (Auezov South Kazakhstan State University).

#### **Standard 2. Development, approval of study programmes and information management**

1. Availability of a branch of the department at LLP "Amangeldinsky Company" (K.I. Satpayev Kazakh National Research Technical University).

2. There are international links and close cooperation within the framework of the European Tempus-Tacis program with Lakville University (Lakvilla, Italy) and the University College London (UK) in the field of chemical engineering education (K.I. Satpayev Kazakh National Research Technical University).

3. The following enterprises (employers) actively participated in the implementation of the study programme: Research Institute KAZGORPROEKT, National Center for Complex Processing of Mineral Raw Materials, branch of the Institute of Mining named after Kunaev, LLP Leica Geosystems Kazakhstan, JSC Almaty Heavy Machinery Plant, LLP Kazakhmys Corporation (K.I. Satpayev Kazakh National Research Technical University)

4. Based on the results of scientific research of the Department of Textile Technology, the following courses were developed: - Biocidal Finishing of Textile Materials; - Information Technologies in the Design of Knitted Goods; - Innovative Technologies in Fashion and Textile Industry. To achieve the goals, faculty staff of the department effectively use the training sessions, which are designed to enhance the cognitive activity of students by conducting practical exercises in the form of presentations, business games using interactive methods and means (Almaty Technological University).

5. The branches of the department are organized at the leading food enterprises of Almaty and Almaty region: LLP Aksay Nan, Asia Pishcheservis and Teniz, LLP SMAK, Alatau restaurant, Zhuldyz restaurant.

6. Participation in providing the study programme with leading scientists from foreign universities, practical researchers in oil and gas industry (Kazakh - British Technical University).

### **3. Student-centred learning, teaching and assessment**

1. The envisaged variant of independent work of a student with a teacher during extracurricular time makes it possible to increase the learning achievement of students; the teacher conducts consultations on the most complex issues of the curriculum, and also contributes to the elimination of works being delayed (K.I. Satpayev Kazakh National Research Technical University).

2. Doctoral students who are involved in academic mobility in other higher education institutions of the Republic of Kazakhstan and foreign universities have the opportunity to study the disciplines of K.I. Satpayev Kazakh National Research Technical University remotely in an online mode, with mandatory retraining of the developed study programs in the form of credits. Since the academic period at all courses is held simultaneously, the doctoral students have the opportunity to choose the disciplines from another year of study (K.I. Satpayev Kazakh National Research Technical University).

3. Doctoral students from the accredited study programme can enroll to additional free training with the subsequent certification at specialized courses of the Scientific and Educational Center "Satpayev University-Apple", IBM Academic Competence Center at 3. Doctoral students from the accredited study programme can enroll to additional free training with the subsequent certification at specialized courses of the Scientific and Educational Center "Satpayev University-Apple", IBM Academic Competence Center at K.I. Satpayev

Kazakh National Research Technical University, the Educational and Scientific Technology Center "Satpayev University- HEWLETT-PACKARD". (K.I. Satpayev Kazakh National Research Technical University).

4. Training of doctoral students is closely connected with scientific research conducted at the departments on state budget and contractual topics. The main area of scientific research conducted at the department is the development of technologies for processing and obtaining organic and polymeric materials from raw materials of the Republic of Kazakhstan (K.I. Satpayev Kazakh National Research Technical University).

5. The degree of participation of PhD students in the performance of research work is 100%, including on a paid basis (K.I. Satpayev Kazakh National Research Technical University).

6. As innovative methods of teaching in the educational process, such forms of teaching as the use of slide shows, presentation lectures with the use of a multimedia complex are applied; performance of independent tasks and their presentation in the group; writing scientific essays. Along with traditional methods of conducting classes, various innovative methods are practiced, such as presentation lectures using slides, video materials, business games. One of such training methods is conducting a number of laboratory studies in the laboratory for assessing the quality of wool, created in conjunction with JSC KazRuno, as well as in the Laboratory of Technology and Safety of Textile Materials (Almaty Technological University).

7. Constantly operating scientific seminars for PhD students and teaching staff on student-centered education (KBTU).

8. Wide use of innovative technologies for simulation of technological processes by chemical technologies of inorganic substances, solution of business cases with production problems (SKSU).

9. Wide use of virtual laboratory work with modeling of biotechnological processes (SKSU).

#### **Standard 4. Admission of students, progression, recognition and certification**

1. A clear description of the learning outcomes is provided; based on the results, new methods of teaching, learning and evaluation are being mastered; - the level of competence is checked with the help of tests on readiness and suitability, questioning, interviewing, group discussions and presentations (K.I. Satpayev Kazakh National Research Technical University).

#### **Standard 5. Teaching staff**

1. There is a differentiated way of paying the teaching staff for scientific, educational and organizational achievements, which contributes to raising the level of human resources (K.I. Satpayev Kazakh National Research Technical University)

2. For lecturing PhD students, along with leading scientists of the country, foreign professors are involved: prof. Raymond Whitby, student of Harold Kroto, Nobel Prize in Chemistry, 1996, leading scientists in the field of chemical engineering and polymer chemistry Prof. S. Mihałowski (University Brighton, England), prof. Gladyshev G.P. (Institute of Physical Chemistry named after Semenov RAS), prof. I.A. Gritskova and prof. N.I. Prokopov (Moscow University of Fine Chemical Technology named after M.

Lomonosov, Russia), prof. S.Kazaryan (Imperial College, England) (K.I. Satpayev Kazakh National Research Technical University).

3. Availability of professional scientific schools. (K.I. Satpayev Kazakh National Research Technical University, SKSU)

4. Active training of the teaching staff with innovative methods of teaching. (3. Availability of professional scientific schools. (K.I. Satpayev Kazakh National Research Technical University, SKSU)

5. In reports of the teaching staff on PhD theses, it is reflected that they are actively engaged in scientific research. The department is actively engaged in research activities, for example, in 2014-2015, there was a research on 2 funded projects, and several projects participated in the competitions of the Ministry of Education and Science of the Republic of Kazakhstan for grant funding (K.I. Satpayev Kazakh National Research Technical University)

6. Constantly operating research seminars for teaching staff and PhD students (all universities)

7. Qualitative improvement of the professional potential of the teaching staff is facilitated by the system of professional development, which is implemented through postgraduate education programs, academic exchange programs, professional internships, specialized courses, guest lectures, training seminars. Over the last 3 years, the entire faculty has underwent professional development in the framework of the following programs: Accomack, Gerber, Commercialization of Technologies, Foreign Experience in Creating and Implementing Innovative Technologies in the Light Industry, Textile Trends and Accessories for 2014 - 2015, Innovative technologies in clothes for active types of sports, including PhD students Kiyabaeva S., Igembaeva G. The University has an information and educational center equipped with modern facilities, a distance learning center (ATU).

8. To implement the study program, the department invites you to lecture, conduct master classes, leading domestic and foreign scientists. Over the past three years, more than 15 scientists from different countries have been invited to lecture at the university (ATU).

9. The teaching staff from the department carry out grant and initiative research studies. The staff of the department annually participate in scientific projects in competitions and tenders of the Ministry of Education and Science of the Republic of Kazakhstan (ATU).

10. Active participation of the teaching staff in the development of scientific projects and implementation of research projects funded by the Ministry of Education and Science of the Republic of Kazakhstan, participation in competitions and exhibitions on the national and international levels. Functioning of the testing laboratory "Food Safety" of the Center for Quality and Safety of Food Products (ATU).

11. The experience of long-term international cooperation with the departments of the St. Petersburg University, Belarusian State Technical University in the training of research staff (SKSU).

12. Active involvement of corporate partners in research activities, including the South-Western Research Institute of Animal Husbandry and Plant Growing (SKSU).

13. Close cooperation with leading scientific organizations in the field of petrochemistry and oil refining from Russia, the Czech Republic, and Azerbaijan (SKSU).

#### **Standard 6. Learning resources and student support**

1. Availability of a sufficiently powerful resource base: service departments, structural units and other services to support doctoral PhD students in their educational activities. And also a good supply of doctoral students with a sufficiently powerful material and technical base and means of information support.

2. The university has introduced a new service in the field of education based on the use of new information technologies, which allow students to have quick and easy access to information related to the educational process: sensory information terminals; WAP-portal designed to provide mobile information; mobile applications on the platform of iOS and Android; a training management system for KazNTU (LMS KazNTU). Informatization of the educational process at the university is based on its own computer information system "Polytech" (CIS "Polytech").

3. The Educational and Scientific Bread Center for the production of bakery products operates at the department, where technological equipment is installed (Italy) (ATU).

4. The availability of a research laboratory for the technology and safety of textile materials for conducting experimental and research work by doctoral students and faculty members (ATU).

5. On the basis of the department there is a Training and Research Center for meat processing for the implementation of the study program, which is undoubtedly a positive practice that allows students to acquire professional skills (ATU).

6. In multimedia lecture and practical exercises multimedia projection equipment is actively used. In the course of lectures and laboratory classes, illustrative photos and video materials are shown on the projection screen. On the central server of the department, a database of videos and photographs illustrating the main technological stages of the production of various food products has been collected and placed in the public domain for downloading from the local network (ATU).

7. Three educational, research and production complexes with the possibility of attracting employers, experienced specialists for scientific research of doctoral students have been opened.

8. Funding of expenses for obtaining patents to the teaching staff and doctoral students (SKSU).

9. Renting out apartments for teaching staff and doctoral students (SKSU).

10. An innovative model of the process of information and library services for doctoral students (SKSU)

#### **Experts' remarks in regards of study programmes:**

**Standard 1. Aims of study programmes and policy in the field of quality assurance**

1. Not always the purpose of the declared program corresponds to the purpose of the discipline.

2. Objects of scientific research are weakly related to the requirements of state programs of industrial and innovative development of the country.

3. There is no work to protect intellectual property rights outside the Republic of Kazakhstan within the framework of the Eurasian Union and in far abroad countries.

## **Standard 2. Development, approval of study programmes and information management**

1. Weak participation of faculty members in the examination of study programs.

2. Employers and doctoral students do not participate in the development of study programs, and, accordingly, there is no feedback on their improvement.

3. There is no external expertise and review when approving a number of programs.

4. Weak information about the results of scientific activities of related higher education institutions in the near and far abroad, the absence of the journal "Bulletin of KazNTU" in foreign scientific libraries.

5. In some programs, the list of literature includes data from the 1960s.

## **Standard 3. Student-centred learning, teaching and assessment**

1. Low level of internal academic student mobility.

2. Insufficient number of publications of doctoral candidates in publications with non-zero impact factor.

3. There is no internal assessment of the quality of doctoral candidates' plans by years of study, their discussion (there is only a statement of topics) and therefore there is a serious change in topics after 2 years of training.

4. The departments do not pay due attention to the interaction of doctoral students with universities of similar profile in the near abroad.

## **Standard 4. Admission of students, progression, recognition and certification**

1. In terms of the development of "postgraduate support" (verification phase), there is no stage of postdocological scientific research (postdoc fellow), preceding the academic position.

2. Low defensibility of doctoral students studying under the target form of training taking into account the availability of a dissertation council in a university for this specialty.

3. Weak work of the Alumni Association of Satpayev University called "Alumni"

## **Standard 5. Teaching staff**

1. Comparatively low volume of international publications in the editions of Thomson Reuters and Scopus.

2. A small number of invited foreign scientists from the QS top-ranking universities.

3. Comparatively low volume of international publications in the editions of Thomson Reuters and Scopus;



4. Foreign scientists are not attracted to lecture and conduct consultations within the framework of the "Visiting Professor" program.

### **Standard 6. Learning resources and student support**

1. There are no physical laboratory stands in the educational laboratories of the department, the available ones do not meet modern requirements and are morally outdated.

2. A small supply of nonresident students with accommodation in the dormitory.

3. During the interview with doctoral students it was revealed that they are insufficiently provided with accommodation in the dormitory. The university canteen and wardrobe are not functioning.

4. Absence of licenses for applied software

5. In certain study programmes, there is insufficient use of capabilities of existing engineering laboratories.

6. Insufficient funding of research carried out by PhD students.

### **Experts' recommendations for study programmes:**

#### **Standard 1. Aims of study programmes and policy in the field of quality assurance**

Strengthen the work on the organization of targeted training of specialists for a particular employer, which will increase the responsibility of universities to graduates.

#### **Standard 2. Development, approval of study programmes and information management**

1. Develop joint international study programs with leading universities in the near and far abroad.

2. Include several profiling disciplines in English in connection with integration into the international educational and scientific area.

3. Develop a procedure for wider involvement of doctoral students and employers in the process of developing and reviewing the study program.

4. More carefully approach to the selection of topics for scientific research of PhD students.

5. Update the topics of dissertation research studies taking into account state programs and priorities of industrial and innovative development of the country.

6. Expand cooperation with leading foreign and Kazakh universities on the development and implementation of study programs for the development of academic mobility and the creation of joint study programs.

7. To redistribute the number of hours and credits in favor of special disciplines by reducing hours and credits for general education subjects (employers' offer).

8. When drawing up study programs, pay more attention to core disciplines and increase time for practice, especially in the CIS countries, and save the money spent on conducting experiments (based on interviews of doctoral students and employers).

9. Depending on a student doctoral candidate and the direction of his scientific research, introduce new elective disciplines in cooperation with employers and a foreign consultant.

10. Continue cooperation with enterprises to develop curricula. In order to train specialists of the international level it is necessary to intensify activities on finding partners for the development and implementation of joint study programs for doctoral studies, to develop external academic mobility.

11. To use more widely distance educational technologies in the process of preparing doctoral students, creating the necessary base for this, as well as electronic content.

### **Standard 3. Student-centred learning, teaching and assessment**

1. Increase the effectiveness of international internships in the framework of academic mobility of doctoral students.

2. Consider simplification of the procedure for obtaining necessary documents for doctoral candidates wishing to undergo internships abroad.

3. Pay attention to the problem of wider introduction of new modern educational technologies (case studies, discussions, presentations, round tables, business games, etc.) to improve the effectiveness of teaching and achieve the highest results in the implementation of this study program.

4. The topics for PhD dissertations on "junctions" of sciences, should be carefully formulated taking into account modern, complex, perspective directions of scientific developments.

5. Expand the practice of using international relations with leading universities abroad to increase the volume of published results of scientific achievements for young scientists, including publications with a high impact factor.

6. PhD research studies are carried out under active commercialization of the results obtained.

### **Standard 4. Admission of students, progression, recognition and certification**

1. Organize a permanent scientific seminar at the graduating department to discuss current research achievements of doctoral students and the status of dissertations.

2. In order to improve the level of applicants' preparation for admission to doctoral studies on a targeted basis, they should practice their preliminary training at the graduating department.

3. Since the weak basic training and the absence of a scientific reserve do not allow some doctoral students to prepare a thesis for defense in time, when enrolling in doctoral studies, it is more demanding to approach the selection of target doctoral candidates from regional universities and to require them to have an appropriate scientific reserve.

4. To intensify activities on the petition to the Ministry of Education and Science of the Republic of Kazakhstan on increasing the number of grants and special places for doctoral studies.

### **Standard 5. Teaching staff**

1. Increase the mobility of leading teaching staff in foreign specialized leading organizations.

2. Conduct activities on the search for and implementation of joint international research grants, programs with the involvement of foreign partners.

3. Develop a long-term plan for the language training of the teaching staff for the development of a system of multilingual education within PhD study programs.

4. Scientific advisers should take an active part in competitions held by MES RK, NATR, national companies and contractual works. The availability of funded projects will allow doctoral candidates to have: additional earnings, to compensate for travel expenses and supplies. The funding of science also allows to obtain permission for admission to the object of research. This will allow doctoral schools to conduct basic experimental studies within industrial facilities rather than on experimental laboratory facilities, which will help to get better results faster, accelerate the terms for defending dissertations.

5. To strengthen the personal responsibility of scientific leaders and foreign consultants for the final result of research supervision in the form of a presentation to completed thesis work before the defence.

6. Since the poor quality of work done by research supervisors leads to a delay in the preparation of dissertations for defence, then it is recommended to more carefully approach the selection of research supervisors for PhD students.

7. Increase the number of training sessions with the use of innovative teaching methods.

8. Strengthen the work on the language training of teachers from the departments which provide target training to Master students of this specialty for further admission to doctoral studies.

### **Standard 6. Learning resources and student support**

1. Increase the volume of literature in Kazakh for special disciplines as well as for major subjects in foreign (English) language.

2. Conduct work on the development of electronic teaching textbooks and virtual laboratory and practical works on the disciplines of the study program.

3. Strengthen the work on creating and using electronic textbooks, recording video lectures and computer programs in the learning process.

**Statistics on the number of doctoral students in study programs in the field of education**

№	HEIs	Study programme	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017
1	K.I. Satpayev Kazakh National Research Technical University	6Д071600 - Instrument Engineering			2	2	2		
2		6Д070400- Computer Science and Software		9	12	14	13	12	
3		6Д070700 – Mining		5	5	7	10	15	
4		6Д070300 – Information Systems		10	11	12	10	8	
5		6Д071000 – Material Science and Technology of New Materials		7	8	13	13		
6		6Д071900 – Radio Engineering, Electronics and Telecommunications		1	4	11	14	12	
7		6Д072300 – Technical Physics	1	5	8	9	7		
8		6Д070200 – Automation and Control		11	14	14	13	9	
9		6Д070600 – Geology and Exploration of Mineral Deposits	2	5	7	11	13	8	
10		6Д070800 – Oil and Gas Engineering			8	7	7	10	11
11		6Д072100 – Chemical Technology of Organic Substances			5	6	6	3	5
12		6Д075500 – Hydrology and Engineering Geology			3	5	10	15	18
13		6Д071800 - Power Engineering			4	2	2	2	1
	Almaty Technological University	6Д072700 – Technology of Food Products	5	4	7				

		6Д072800 – Technology of Processing Industries		3	6				
		6Д073500 – Food Safety	1	1	1				
		6Д073600 – Technology of Non- Food Products	1	1	1				
	Auezov South Kazakhstan State University	6Д073300 – Technology and Design of Textile Materials			1	1	2		
		6Д073000 – Manufacture of Building Materials, Products and Structures							1
	Kazakh - British Technical University	6Д070800 – Oil and Gas Business		3	7	11	11	7	
		6Д070500 – Mathematical and Computer Modeling		3	6	10	9	8	
	Karaganda State Industrial University	6Д074000 – Nanomaterials and nanotechnologies	1	1	1				
	Overall:		11	69	121	135	142	109	36

Distribution of assessments of expert groups under the accreditation of doctoral study programs

Standards of accreditation	Levels of compliance with accreditation standards			
	Full compliance	Comply with minor remarks	Comply with remarks	No compliance
Standard 1. Aims of study programmes and policy in the field of quality assurance	86,1%	11,6%	2,3%	
Standard 2. Development, approval of study programmes and information management	65,1%	34,9%		
Standard 3. Student-centred learning, teaching and assessment	44,2%	55,8%		
Standard 4. Admission of students, progression, recognition and certification	86%	14%		
Standard 5. Teaching staff	58,1%	41,9%		
Standard 6. Learning resources and student support	79,1%	20,9%		
Standard 7. Public information	83,7%	16,3%		