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MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN

Republican state enterprise on the right of economic management "M.Auezov South Kazakhstan State University" of MES RK

Institute of postgraduate education

REPORT

on the self-assessment of educational programme 6D072000- Chemical technology of inorganic substances for compliance with the criteria of standards of specialized accreditation of the Independent agency for quality assurance in education (IQAA)

Date of program introduction: 2009
Program location:
Shymkent city, Tauke khan, 5.
Date of report submission:
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Shymkent, 2019

General information about the educational program (EP)

Data on the state license for the right to conduct educational activities	Issued by the Committee on the Control of Education and Science MES RK on 14.11.2012 y., №12019073
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EP title, academic degree	6D072000 – Chemical Technology of Inorganic Substances, Doctor PhD
Languages of instruction	Kazakh, Russian, English
The beginning of training the doctoral students in EP	2009 up to present - 6D072000 – Chemical Technology of Inorganic Substances
Forms of training, duration of training	- full-time/3years

We confirm the reliability of the report on self-assessment of the educational program 6D072000 – Chemical Technology of Inorganic Substances:

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NOTATION AND ABBREVIATIONS

SKSU – M.Auezov South Kazakhstan State University
SOES - State obligatory education standard;
SOS PE - State obligatory standard of postgraduate education;
CTIS - Chemical technology of inorganic substances;
CTOS - Chemical technology of organic substances;
HS – high school;
STC – scientific and technical council;
MES RK - Ministry of Education and Science of the Republic of Kazakhstan
QMS - quality management system;
C- curriculum;
IPE - Institute of Postgraduate Education;
SRW - Scientific research work;
DSRW –Scientific research work of doctoral students;
EMCS – educational-methodical complex of the specialty;
EMCD - educational-methodical complex of the discipline;
TS – teaching staff;
EML - educational and methodical literature;
CCES MES RK – Committee for the Control in Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan;
SIWT - students independent work with a teacher;
LLP - Limited Liability Partnership;
EIC - Educational Information Center;
MEP - modular educational programme;
EP - educational programme;
ESIC - Educational Scientific Industrial Complex;
EC - electronic catalog;
ISVUZ - automated information system;
TREL "CBM" - Testing Regional Engineering Laboratory «Constructional and biochemical materials»
CED – catalog of elective disciplines;
NC SSTE – National Center of State Scientific-and-Technical Expertise.

NORMATIVE REFERENCES

This self-assessment report uses references to the following regulatory documents:

Law of the Republic of Kazakhstan «On education» (with amendments and additions dated 04.07.2018);

Model rules of activity of educational organizations implementing educational programmes of higher and (or) postgraduate education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan from 30 October 2018 No. 595 (registered by the Ministry of Justice of the Republic of Kazakhstan, dated 31 October 2018, No. 17657);

State compulsory education standard SOES RK No. 1080 from 23.08.2012. as amended by the Government Decree of RK No. 2 92 from 13.05.2016.;

State obligatory standards of higher and postgraduate education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan, dated 31 October 2018, No. 604;

Model rules for admission to higher educational institutions that implement professional education programmes of higher education dated 19 January 2012, No. 111 (with changes and additions from 08.06.2018, No. 334);

Rules for organization of the educational process on the credit technology of education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan dated 20 April 2011, No. 152 with amendments and additions from 12 October 2018, #563;

Rules for organization and conducting professional practice and rules for determining organizations as bases for practice, approved by an Order of the Minister of Education and Science of the Republic of Kazakhstan dated January 29, 2016, No. 107 with changes from 29.09.2018, No. 521.

Introduction

M.Auezov South Kazakhstan State University (SKSU) is Kazakhstan's largest multi-disciplinary university, providing training on a 3-tier system: Bachelor's programme – 95 educational programmes, Master's programme - 59 educational programmes, PhD doctorate - 19 educational programmes.

According to research of British consulting company Quacquarelli Symonds (QS), ranking top universities in the world (QS World University Rankings) in terms of their achievements in the field of education and science, M.Auezov SKSU takes place 450+ among 7,000 universities, participating in the ranking. In the General ranking of Independent agency for quality assurance in education (IQAA), formed on a basis of the analysis of academic statistical indicators, expert evaluations and employer surveys, M.Auezov SKSU for several years demonstrates leading positions and it is on the third place in the ranking of the best multi-disciplinary universities in Kazakhstan. Educational programmes (EP) bachelor's and master's programmes of «Chemical technology of inorganic substances» specialty occupy the first places rated in 2018.

The Department «Chemical technology of inorganic substances» conducts training specialists for the chemical industry for 56 years, since 1963. It was the first department in the Republic of Kazakhstan, which began to train a wide range of chemical engineers and technologists. PhD doctoral students training on EP 6D072000 - Chemical technology of inorganic substances is performed since 2009 on a basis of a license, series AB No. 12019073, an order of MES RK from 14.11.2012.

The educational programme is developed in accordance with the State obligatory standards of higher and postgraduate education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan from 31 October, 2018 No. 604; sample curriculum of the specialty 6D072000- Chemical technology of inorganic substances, approved by an order of the MES RK No. 425 from 05.07.2017, industry qualifications framework «Chemical production», approved as of 16 August, 2016, minutes №1 (*Annex 1*).

EP «Chemical technology of inorganic substances» for training PhD doctors supposes fundamental educational, methodological and research training with in-depth study of modules on innovative technologies of inorganic substances. Duration of doctoral studies is 3 year. Training is conducted on credit technology in the state, Russian and English languages. The number of doctoral students on September 1, 2018 is 22 people.

1 POLICY OF QUALITY ASSURANCE OF THE EDUCATIONAL PROGRAM

The quality policy is formulated on the basis of the university development strategy and corresponds to the mission, goals and objectives of the university. The SKSU mission is to form the country's intellectual elite based on the generation of new knowledge and the university transformation into an entrepreneurial university. The main strategic goal of the university is the transformation into a research and entrepreneurial university, providing training in close cooperation with employers.

In order to coordinate activities of the structural units in the organization of education quality assurance system in SKSU, the Department of Strategic Development and Quality Management has been created, the university strategic development plan and Guidelines on Internal Quality Assurance of Doctoral Studies have been developed, and an university information system ISVUZ for quality management has been implemented.

The functional model of the university's internal quality assurance system generally conforms to the standards and requirements of the process model of the quality management system adopted in ISO 9001: 2015 standard, Standards and guidelines for ensuring the higher education quality in the European Higher Education Area (ESG) and acts of the Republic of Kazakhstan. The system of internal quality assurance of educational activities includes a set of external and internal mechanisms.

The basis of internal mechanisms is self-examination (self-control at the faculty and student's level, self-assessment, self-certification at the level of the university and certain types of activities). The issues of improving the quality of training specialists are the main subject of discussion of rector regular meetings with the faculty and student groups of the university. Annual reports of the rector on the university activities are traditional.

The assessment of the implementation degree of quality assurance policy is performed by analyzing data from the point of view of assessing the effectiveness of university processes, as well as determining directions for improving the process effectiveness, improving products and processes. Data analysis is performed at all levels of SKSU.

The system of quality assurance of SKSU educational services includes five levels of organization: the first level is implemented by the administration through the Quality Coordination Council, the Academic Council, the Scientific and Technical Council (STC); the second level is implemented by the dean of the higher school (HS) and the Institute of postgraduate education (IPE) through the higher school council, the final attestation and examination commissions; the third level is conducted by the department in the following areas: control the quality of

doctoral studies and determination of ways to further improvement; analysis of scientific papers and filing for patents writing skills of doctoral students, etc.; quality control of readiness of the department teaching staff for training classes; material and technical support of the educational process; current knowledge control; the fourth level is implemented by doctoral students, lecturers and graduates in the following areas: satisfaction of doctoral students with the quality of the organization of the training process, practice, internships and research; lecturer satisfaction with work organization; evaluation of graduates' learning outcomes; the fifth level realizes an employer on a basis of practice and work results of graduates.

Development and implementation of the doctoral education programme is performed in accordance with the State obligatory standards of higher and postgraduate education (approved by an order of the Minister of Education and Science of the Republic of Kazakhstan, dated 31 October 2018, No. 604), Salzburg principles and Industry qualifications framework «Chemical production», approved as of August 16, 2016, minutes №1). The objectives of the EP correspond to the 8-th level of the National Qualifications Framework of the Republic of Kazakhstan. They are also harmonized with the Dublin descriptors, the 3 cycle of a Framework for Qualifications of the European Higher Education Area, and the 8-th level of the European Qualifications Framework for Lifelong Learning.

The educational programme is developed on a modular basis and contains goals, learning outcomes and competencies. The learning outcomes achieved in the process of EP mastering are determined based of key general and professional competencies developed on the basis of the industry qualifications framework "Chemical Production", taking into account the requirements of the labor market, expectations of employers, interests of students and social demand of society. The learning outcomes reflect the level of competencies achieved by students and confirmed by the assessment, confirming knowledge, understanding and skills upon completion of the EP study (*Annex 1*).

Representatives of industrial enterprises on the production of phosphorus, mineral fertilizers, acids and salts - partners of CTIS Department, namely director of NDFZ Kazphosphate LLP Frangulidi L.Kh. in the framework the cooperation agreement participate in the development and implementation of the Doctoral programme "Chemical technology of inorganic substances". The representative of the partner university - doctor of technical sciences, professor of the Belarusian State Technological University, Dormeshkin O.B. (Minsk, Republic of Belarus) participate in the development of the doctoral education program. The educational programme is developed based on the sample curriculum for the specialty 6D072000 - CTIS.

After EP discussion and approval at the Department meeting it is sent for internal examination. Internal independent examination is carried out by an expert group established at the higher school level from among the leading teachers. Next, the EP is sent for external examination to employers of the training profile. Expert opinions of employers are attached (*Annex 2*). University Academic Council approves the EP on the recommendation of the Educational and Methodological Council. A positive external review on the EP "Chemical Technology of Inorganic Substances" has been received from Petropavlovskiy I.A., professor of D.I. Mendeleev Russian Chemical Technological university (*Annex 2*).

The Doctoral Modular Education Program (MEP) contains educational and research components, it is formed of various types works that determine the contents of education, reflecting their relationship, measurement and accounting. The research component of the educational programme is formed of the research work, preparation of scientific publications and performing the dissertation for the degree of Doctor of Philosophy (PhD). The workload of educational and scientific work of students is determined by the amount of material mastered in the amount of 180 credits ECTS.

The contents of the doctoral educational program includes a theoretical course; a research program, including a doctoral thesis; practical training of doctoral students: pedagogical and research practice; intermediate and final certification. The Doctoral EP "Chemical Technology of Inorganic Substances" provides for studying the following disciplines in cycles: The cycle of basic disciplines (BD) consists of 1 module of the obligatory component (OC) (5 ECTS credits), the cycle of specialized disciplines (PD) includes 4 elective modules (22 ECTS credits). The MEP also presents learning outcomes of doctoral students and the acquired competencies (*Annex 1*).

To enhance the research competence of doctoral students, elective disciplines were introduced into the educational program using an interdisciplinary approach: "Optimization of chemical-technological processes" to master the methods of mathematical planning of the experiment and "Research Methodology" to form a scientific approach to designing scientific research. Mastering the discipline "Management of scientific projects" promotes to the development of skills of independent thinking and planning in order to analyze and summarize research results and defend their own scientific ideas (*Annex 1*). Successful mastering of these disciplines will allow doctoral students to acquire skills in working with databases in English, perform an electronic search of literary sources on the research topic, prepare and publish scientific articles in rating journals, conduct independent scientific research in accordance with the plan and main phases of research work, develop a scientific research project on the research topic, perform mathematical processing of experimental data using information technologies, analyze scientific results and make conclusions.

The structure of PhD doctoral educational programme “Chemical technology of inorganic substances” provides for the passage of pedagogical and research practice. Pedagogical practice is a preparation for scientific-and-pedagogical activity in a higher educational institution; it helps to consolidate skills of teaching special disciplines, organizing educational activities of undergraduate and graduate students, and performance of educational-and-methodical work. The practice bases are universities and departments on the profile of the educational programme. Programmes of practices have been developed by CTIS department based on profile of the specialty. During their pedagogical practice, doctoral students familiarize with methods of teaching disciplines, conducting lecture classes, practical and laboratory classes, compiling EMCD of disciplines taught by scientific consultants.

Research practice is conducted at operating enterprises, in scientific laboratories or at leading universities in profile of the educational programme. The goal of the doctoral research practice is to study the latest theoretical, methodological and technological achievements of domestic and foreign science, consolidate practical skills, apply modern methods of research and analysis, collect, process and interpret experimental data in the dissertation research, conduct pilot tests of the proposed technology or modernization of the technological line section. The bases of research practice for doctoral students are following ones: - LLP “Kazphosphate”, Taraz city, LLP “KazAzot”, Aktau city, LLP “KazNIIKhimproekt”, Shymkent city, LLP "KazAtomprom", Suzak district, LLP “Kainar”, Shymkent, TREL “CBM”, M. Auezov SKSU.

To implement the EP the department has developed:

- catalog of elective disciplines (CED);
- educational and methodical complexes of disciplines (EMCD), which include working training programs and syllabuses;
- materials for classroom work on each discipline (module): lecture notes, plans for seminars and laboratory classes with a breakdown into sections, with an weeks’ indication and the schedule for current certification, types of knowledge control;
- materials for independent work of doctoral students: a list of tests, assignments, self-control materials for each discipline (module), a list of compulsory and additional literature on SIW and SIWT topics, a schedule of individual consultations on study and scientific issues;
- materials for knowledge control: written control assignments and tests, exam tickets, schemes of business games, trainings, thematic issues for discussions;
- practice programmes and guidelines for all practices;
- materials for research / experimental research (guidelines, schedules of scientific seminars, etc.).

All teaching materials were reviewed at the department meeting, at a methodical commission meeting of the HS CEB and recommended for publication by the Educational and Methodical Council of the University.

During the implementation of the educational program, the doctoral student is the central figure of the educational process; therefore his/her interests are primarily taken into account. All stages of the doctoral student life cycle are regulated by a set of documents: State obligatory standards of higher and postgraduate education, approved by order of the Minister of Education and Science of the Republic of Kazakhstan on October 31, 2018 No. 604; The standard curriculum of postgraduate education 6D072000-Chemical technology of inorganic substances (Order of the Minister of Education and Science of the Republic of Kazakhstan dated July 05, 2016 No. 425, *Annex* 459). The organization of the educational process in doctoral studies provides for the creation of the most favorable conditions for the mastery of the doctoral educational programme.

Doctoral students are involved in the development of a modular educational program, their proposals are taken into account when developing the curriculum and formation of the contents of separate disciplines. Doctoral students actively participate in the planning, implementation and monitoring all the processes conducted at the university; they individually plan their educational route by selecting disciplines based on the catalog of elective disciplines (CED). CED of the EP is annually updated to meet the requirements of employers. Participation of teaching staff and doctoral students in the university management is ensured by their right to be elected to the collegial management bodies, to make proposals for improving the educational process.

The educational programme is constantly updated according to the elective modules of the curriculum, which satisfy the current state of the labor market. Representatives of “Kazphosphate” LLP recommended to include in the curriculum the disciplines “Optimization of chemical-technological processes” and “Management of scientific projects”, promoting to the development of professional skills to independently develop or improve technologies of inorganic compounds using the results of research conducted on funded projects.

Doctoral students are involved in the implementation of quality assurance procedures of the educational process at the levels of department and HS as well as through university-wide youth organizations. Representatives of doctoral students are involved in the management of the educational process at the department, high school and university levels. For example, Zhanikulov Nurgali, a doctoral student of CTIS EP, is a member of the Academic Council of HS “Chemical Engineering and Biotechnology” and a chairman of the Council of Young Scientists of the HS. He actively represents the opinion of all doctoral students on educational and scientific work and can influence the making decision on improving the teaching quality and providing support to doctoral students. The university practices a day

of student self-government, during which once a month students occupy the positions of dean, head of department and teachers in classes and can make decisions on current issues.

The training load on the educational programme "Chemical technology of inorganic substances" for 5 years is given in *Annex* 3. Information on the safety of doctoral students' contingent per semesters is given in *Annex* 4, which speaks for all doctoral students are trained for the entire training period, graduated and have an access to doctoral thesis defense.

To support doctoral students in the formation of an individual curriculum and mastering the educational programme during the period of study at the department, an adviser Dzhanmuldayeva Zh.K. was appointed in the academic year beginning. Doctoral students are provided with an academic calendar and reference guide, which reflects the university's academic policy in the field of doctoral studies, the rights and duties of students, methods of assessing performance, requirements for final state certification. In compilation of the curriculum and catalog of elective disciplines, the opinion of doctoral students is taken into account. In the current academic year, all doctoral students of educational programs "Chemical technology of inorganic substances" and "Chemical technology of organic substances" participated in a seminar to discuss the new "Guidelines on internal quality assurance in doctoral studies", at which the lecturer explained in detail the student-centered approach in teaching doctoral students.

The University conducts purposeful work on the formation of motivated and talented contingent of doctoral students. Admission to the PhD-doctoral programme is based on clearly developed criteria available for applicants. Persons with a master's degree and work experience of at least 1 year are accepted to the PhD-doctoral programme. Citizens of the Republic of Kazakhstan and stateless persons entering a doctoral programme, with the exception of foreigners, pass the entrance examination in the specialty for a group of doctoral educational programmes. Applicants to doctoral studies provide international certificates (IELTS/TOEFL), confirming the knowledge of a foreign language in accordance with European competencies (standards) of English proficiency. Foreigners entering the doctoral studies pass entrance exams: on the state or Russian languages (language of training); on specialty.

For entrance examinations to the doctoral studies, an examination committee is created for a group of educational programmes, formed from among the teachers of graduating departments of the university with a degree in this specialty. The entrance exam in the specialty is conducted by the university independently in the test form on the basis of modules studied in the Master's programme. Admission to the doctoral programme is conducted by the university admission committee on the basis of entrance exam results for groups of doctoral educational programmes and a certificate confirming foreign language proficiency

in accordance with European competences (standards) of foreign language proficiency. Retake of entrance exams is not allowed.

Figure 1 presents data on the admission of applicants to the educational doctoral programme "Chemical technology of inorganic substances" for the period 2014-2018. As follows from the diagram, there is a steady demand for EP CTIS from applicants entering the doctoral program - yearly the number of people wishing to study in the doctoral programme in this specialty is several times higher than the amount of state educational grants. There are no trainees on a commercial basis. In the last 2 years, the state educational order for doctoral studies in this specialty has significantly increased by almost several times compared with 2014-2016, and therefore the admission of doctoral students has increased. So, in 2017 doctoral students were enrolled in all 8 state educational grants. The number of applicants in 2018 was record high - 25 applications for 15 grants were submitted. Of these, the entrance exams successfully passed 12 applicants. As a result, the contingent of doctoral students in the 2018-2019 academic year is 22 people (*Annex 4*).

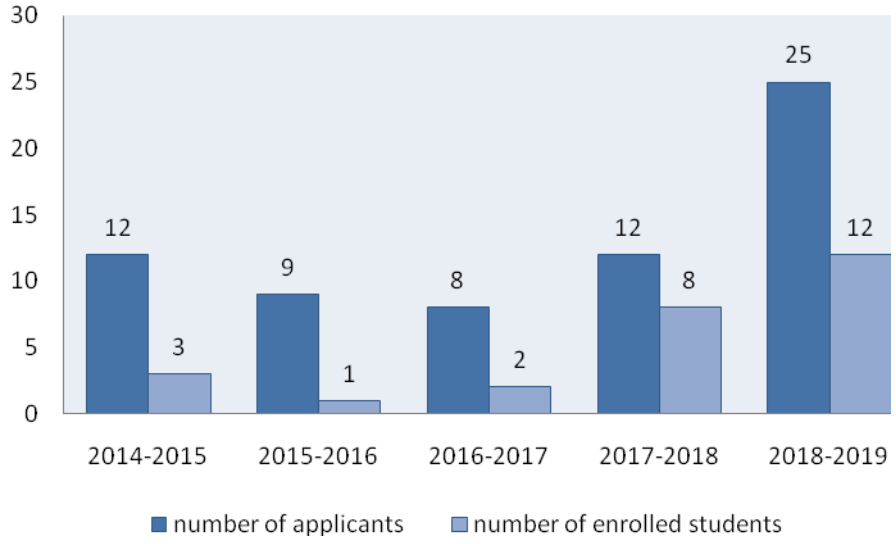

Figure 1 - Admission and enrollment of students in 2014-2018

Applicants entering the doctoral programme sign an individual agreement with the university, according to which the university provides the graduate of the doctoral programme who successfully defended a doctoral thesis, employment in the university department, according to the profile of the doctoral student training. Employment of graduates of the doctoral programme is 100%.

When enrolling to the doctoral studies, scientific achievements are taken into account that correspond to the profile of the chosen specialty: work experience in the specialty profile; number of scientific publications on the subject of the

proposed doctoral thesis, including those published in rating scientific journals; certificates of research, certificates of scientific scholarships, grants; certificates / diplomas for participation in scientific conferences and competitions, which are reflected in the applicant's personal sheet. In the process of competitive selection for state educational grant the applicants with more significant portfolio are given priority right for enrollment.

To determine the research potential of applicants, the list of questions for the entrance exam includes questions related to the choice of the planned scientific work topic. When enrolling to the doctoral studies in a case of identical indicators of competitive points, the right of first choice for enrollment is given to the persons with the highest mark in the specialty; in a case of the same indicators of the entrance examination in the specialty, the priority is given to persons with the highest mark in a foreign language. The presence of scientific articles related to the chosen doctoral specialty is also taken into account. Preference for enrollment in a state educational grant is given to applicants with basic education corresponding to the chosen specialty.

To form necessary contingent of doctoral students, the department conducts career guidance work among master students of this and related specialties studied at the university. In the process of master student training the supervisors direct graduate students to continue their studies on the third level programme - in doctoral studies, while forming the theme of the master's thesis with the expectation of continuing this study when admission to doctoral studies. Such master students, as a rule, after master thesis defending are recommend by the State Attestation Commission for training continuation at the doctoral studies. In this case, recruitment to the doctoral program of high-skilled applicants corresponding to the specialty profile is provided.

In addition, the department effectively collaborates with other universities, providing training of master students in this specialty, and industrial enterprises in order to get acquainted themselves with the conditions of admission and training and invite them to doctoral studies. As can be seen from Table 1, most of the doctoral students are teachers or graduates of the master's programme at M. Auezov SKSU. The profile of their work corresponds to the direction of "Chemistry and Chemical Technology". Some doctoral students are representatives of the largest specialized industrial chemical enterprises, such as “KazAtomprom” LLP, “KazAzot” LLP, “Petro Kazakhstan Oil Products” LLP.

Table 1 - Employment of doctoral students before admission to doctoral studies

№	Doctoral student full name	Supervisor full name	Last place of work / master training
Doctoral students of the first year of study			
1	Asylkhankyzy	Professor	M.Auezov SKSU, Department on

	Aygerim	Seitmagzimova G.M.	Academic Affairs (DAI), Employment Department, Specialist of highest study qualification - inspector
2	Kambatyrov Maksat Batyrovich	associate professor Nazarbek U.B.	Graduate from master programme of M.Auezov SKSU
3	Kareeva Anar Isakhankyzy	Professor Besterekov U. B.	Assay evaluation board "Standard", laboratory assistant
4	Ormanova Gaukhar Meirbekovna	Professor Anarbaev A.A.	Kazspetspredpriyatie JSC, Almaty, chief specialist
5	Urakov Kinis Nurmagambetovich	Professor Besterekov U. B.	Director of “KazAzot” LLP, Aktau city
6	Atyrkhanova Karlygash Kasymkhankyzy	Professor Tleuov A.S., Professor Shevko V.M.	South Kazakhstan Medical Academy, teacher of chemistry
7	Asilbekova Gulnur Tolenyky	Professor Sataev M.S., associate professor Koshkarbayeva Sh.T.	M.Auezov SKSU, Department of Chemistry, teacher
8	Dikanbaeva Ayzhan Kosybayevna	Professor Sataev M.S., associate professor Koshkarbayeva Sh.T.	M.Auezov SKSU, Department of Chemistry, teacher
9	Ziyat Aytzhan Zhumadullauly	Professor Zhantasov K.T.	“Petro Kazakhstan Oil Products” LLP, technological pump operator
10	Kozhakhmetova Aidana Maratkyzy	Professor Zhantasov K.T.	SKSU im.M.Auezova Department of Ecology, teacher
11	Ulbekova Mariam Muskanovna	Professor Anarbaev A.A., Associate Professor Tleuova S.T.	M.Auezov SKSU, Department of Chemistry, teacher
12	Shaimerdenova Guldana Smahulovna	Professor Zhantasov K.T., Associate Professor Kadirbayeva A.A.	M.Auezov SKSU, Department of Informatics, teacher
Doctoral students of the second year of study			
1	Zhumadilova Zhazira Tulzhanovna	Professor Zhantasov K.T.	Graduate from master programme of M.Auezov SKSU
2	Kydyralieva Aziza Dosymbekkyzy	Professor Besterekov U. B.	M.Auezov SKSU, Department of CTIS, teacher
3	Omirova Rayhan Zholdasbayevna	Associate Professor Bolysbek A.A.	M.Auezov SKSU, Department of CTIS, teacher

4	Pazylova Dana Temirbekovna	Professor Tleuov A.S., Professor Shevko V.M.	M.Auezov SKSU, Department of Physics, teacher
5	Abzhalov Ramshad Sadykovich	Professor Sataev M.S.	S. Rakhimov Republican military school "Zhas Ulan", teacher of chemistry
6	Zhanikulov Nurgali Nodiruly	Professor Zh.K. Dzhanmuldayeva Professor B.T. Taymasov	Graduate from master programme of M.Auezov SKSU
7	Smaylov Bақyt Matkarimuly	Professor Tleuov A.S., Professor O. Beisenbayev	National Atomic Company "Kazatomprom", mine of JSC Zarechnoye, shift master
8	Tileuov Hamidulla Yesbolovich	Professor Eskendirov M.Z.	M.Auezov SKSU, Department of Informatics, teacher
Doctoral students of the third year of study			
1	Ermekov Sayat Rakhymbayevich	Professor Besterekov U. B.	M.Auezov SKSU, teacher of CTIS department
2	Userbaeva Banu Abdraymovna	Associate Professor Tleuova S.T.	South Kazakhstan Pedagogical University, teacher of the department "Chemistry"

The effectiveness of teaching, assessed by the department through open training classes, mutual attendance of classes can serve a confirmation of the competence level of teachers. The quality control of the learning process is carried out by the commission of intra-departmental control and the Inspection Commission of the HS, which selectively visit teachers' classes and assess the quality of conducting training classes in groups of doctoral students in accordance with the inspection plan. The results of the inspections are recorded in a list of observation and assessment of the class, in which the level of instruction in various indicators is noted. Lists of observation and evaluation of lectures and practical classes are given in *Annex 5*. The annual quality control of classes shows that classes are conducted at a high scientific and pedagogical level. This is confirmed by the results of the examination session, during which doctoral students successfully pass exams in all disciplines. The quality of teaching is discussed at the University Academic Council, if necessary, decisions are made to conduct unscheduled monitoring of the quality of teaching or to change the teaching staff involved in the doctoral education process.

The quality of educational, methodological, scientific and social work of departments is assessed by the Organizational-methodical control commission of the university. Evaluation of the university activity includes the views of students on the quality of teaching. After the end of each semester, the Department of Strategic Development and Quality Management conducts a questionnaire survey of students “Lecturer through eyes of students” and other types of surveys in order

to identify problems and improve the quality of doctoral students' training. The tools for monitoring the quality of the educational programme, the forms of their implementation and the objectives are listed in Table 2.

Table 2 - Monitoring of the educational programme quality

Target group of questioning	Survey form	Survey objectives
Questioning of applicants	Questionnaire of a standard type	Identify the demand for educational services in this specialty
Studying reviews for graduate doctoral students	Questionnaire "Assessment by employers the specialist training quality", feedback from employers on graduate doctoral students	Determine the quality of graduate training
Studying reviews on the results of doctoral students' practice	Practice diaries, reviews of directors, academics, practice managers, letters of appreciation, etc.	Identify problems in organization and practice
Doctoral student questionnaire	Certification on DSRW implementation for each last semester	Identify problems in DSRW implementation
Questionnaire of lecturers	Questionnaire "Lecturer through eyes of doctoral students"	Identify problems in the organization of the study process
Studying employment and demand for graduate doctoral students	Analysis of employment statistics	Identify labor market problems
Studying the staffing of the regulatory and educational literature	Analysis and examination of the educational and methodical complex of disciplines in the specialty	Identify problems in book provision
Public opinion research (including employers)	Questionnaires	Collection of information and recommendations on improving the specialists' training

Survey results are analyzed by the Department of Monitoring and Quality Management, the degree of students' satisfaction is assessed with the quality of the educational programme and the quality of the educational process. This allows to assess the satisfaction of doctoral students with the chosen specialty, results of training in the university, to identify the attitude of students to the various components of the university education system, to explore the strengths and weaknesses in the organization of study-and-social activities of the university.

According to the results of doctoral students' questionnaire "Lecturer through eyes of doctoral students" of the HS of Chemical Engineering and Biotechnology in 2014-2018, students give a high rating - an average of 4.5 points on a 5-point scale on all questions of the questionnaire (*Annex* 6).

According to the survey "Students' satisfaction with the quality of the study process organization" (*Annex* 7), about one-third of all university doctoral students combine work with study, and for most of them their work is related to a specialty. According to doctoral students, lecture classes are conducted mainly in the form of analysis professional activity situations, brainstorming, using the project method, the Internet and Power Point slides. Seminars (practical classes) are held in the form of discussion, business games, master classes using Power Point presentations, video and audio recordings. Doctoral students of HS consider that the topics of doctoral students independent work are related to the specialty and mainly aimed at the development of professional competencies. Doctoral students also note good conditions created in SKSU for educational, scientific and extracurricular work of students, they are almost completely satisfied with the research work.

The questionnaire survey of lecturers of HS "Chemical Engineering and Biotechnology" on university satisfaction is given in *Annex* 8. Most of the faculty members are satisfied with social support from the administration, results of students independent work with a teacher (SIWT), note the presence of "corporate spirit at the university" (79.9%).

The Department of Monitoring and Quality Management annually surveys employers for satisfaction with the quality of graduate training to take into account the needs of the labor market when training doctoral students (*Annex* 9). According to employers, they are quite satisfied with the quality of graduate knowledge (53.8% of respondents rated as "excellent", 38.5% - as "good").

University top management, teaching staff and doctoral students are actively involved in the planning, implementation and monitoring of all processes performed at the university. Participation of managers at all levels in achieving the goals is conducted through participation in the work of the Academic and Educational and Methodological Council, administration meetings, meetings and methodological seminars, working groups, internal university commissions, audit teams. Doctoral students participate in the process of planning, implementing, monitoring the activities of the university through participation in the work of the Academic Council of the Higher School, as well as through the Council of Young Scientists and university-wide youth organizations.

Doctoral students independently determine the trajectory of study based on the curriculum of the specialty and the catalog of elective disciplines, thereby forming their individual curriculum. With the help of a scientific consultant a student determines the direction of his research, a topic of the doctoral thesis, an

object and a subject of research, in accordance with which individual planning of scientific and educational activity of a doctoral student and formation of his individual work plan for the entire period of study takes place.

CTIS Department has close ties with leading enterprises of Kazakhstan on production of phosphorus, phosphoric and nitric salts, acids and fertilizers; students pass research practice at these enterprises. The CTIS department teaching staff discusses and coordinates with heads of the enterprises the contents of curricula and make changes according to their recommendations. To improve and correct long-term directions of the EP, to set new goals in line with the external changes, the department holds regular meetings and consultations with specialists from enterprises, where comments and suggestions are made to improve the EP contents. In particular, representatives of “Kazphosphate” LLP - NDFZ and ZMU, Taraz city; “KazNIIKhimproekt” LLP, Shymkent city; "KazAzot" LLP, Aktau city; “Kainar” LLP, Shymkent city actively participate in implementation of programme quality assurance policy. Director of “Kazphosphate” LLP NDFZ Frangulidi L.Kh. is also a part-time senior lecturer at CTIS Department and actively participates in the organization of practical training for students in industrial environment. Based on the recommendations of employers, changes are made to the structure and contents of elective disciplines. It promotes to improve the EP quality and its adaptations to promising directions of development of existing industries in order to train specialists in accordance with employers' requests.

Participation of external stakeholders in the implementation of programme quality assurance policy is also conducted through the procedures of external evaluation of state bodies (state attestation, licensing), non-governmental and independent bodies (accreditation, rating).

The university, employers, doctoral students are informed about planned and undertaken actions regarding the EP. Informing is provided directly through the university teaching staff and the site www.ukgu.kz . Each subdivision regularly updates the site information on all types work, on results of assessing the student training quality and on the rating of educational programmes. The informational educational portal www.portal.ukgu.kz provides information for students about the educational process at SKSU, serves various categories users’ requests through access to the Internet and intranet to electronic information resources of SKSU. Students have an opportunity to real-time view the performance, current rating points for semester disciplines and exam schedule on the portal. As part of the information system, a module is developed for an educational-methodical complex of the discipline that replicates to the “Professor” portal and allows students to use metadata such as syllabus, lecture notes, guidelines for laboratory and practical classes, examination materials, etc.

In connection with occurrence of problematic situations and modernization of acting industries, the department scientists are involved in the implementation of

contractual research works commissioned by enterprises in which doctoral students are involved (*Annex 10*). Such hot topics are defined as doctoral theses topics. The results of funded and contractual research works are being implemented both in production and in the educational process. Thus the contents of certain disciplines is updated and enriched with new scientific knowledge.

The results of conducted sociological surveys are used in drawing up programs for the further university development, to develop measures to improve the quality of training, certification and election to the post of teaching staff. Evaluation of effectiveness of internal quality assurance system of the educational program at SKSU is ensured by the implementation of the following measures:

1. A systematic analysis of the educational process quality at the beginning of the semester and after its completion. Evaluation of the EP effectiveness is systematically determined by discussing and analyzing the results of current performance, research, passing all kinds of practices at the department meetings. Based on the decisions the changes are introduced in the EP contents.

2. A systematic analysis of the degree of customer satisfaction, conducted by the department of sociological research. According to the survey results, relevant decisions are made.

3. Internal audits are conducted at SKSU on a basis of a plan approved by the rector, in which the regularity of checking each component of the system is scheduled at least once a year.

If an internal audit reveals disadvantages and incompliances, corrective and preventive actions are applied to identify and eliminate their reasons. SKSU has developed and operates a comprehensive assessment of activities of teaching staff, departments and faculties. Information obtained through measurements and monitoring allows the university to manage incompliances and continuously improve the educational process.

4. Monitoring and product measuring. The quality control of doctoral students' knowledge is conducted at certain stages in accordance with the working curriculum.

External review of developed educational programmes is practiced at SKSU by professors of foreign universities and representatives of business - partner enterprises. Reviews of Orazova M.A., the leading employee of Kazphosphate LLP, Abraliyev E.D., general director of "KazNIIKhimproekt" LLP and Petropavlovskiy I.A., professor of D.I. Mendeleev Russian Chemical Technological University (Moscow, Russian Federation) on the doctoral EP "Chemical technology of inorganic substances" are presented in *Annex 2*. Their comments and recommendations are taken into account when updating the EP.

Every five years, doctoral educational programmes are subjected to specialized accreditation. In the post-accreditation period, the educational programme must pass external monitoring to analyze changes and improvements.

The University also periodically passes an external assessment of the educational programmes quality in the form of a licensing check for compliance with qualification requirements.

SWOT- Analysis of the "Policy of quality assurance of the educational program" part

S (strengthы)	**W(weakness)**
- Effective cooperation with scientific and educational organizations of Kazakhstan and other countries; - Constant participation of employers in the educational process, regular updating the curriculum and contents of academic disciplines recommended by employers; - Steady demand for EP for applicants and increase in the number of doctoral students over the past five years; - Availability of a mechanism for internal quality assessment and examination of the educational programme; - High degree of student satisfaction with quality of the EP implementation; - Employers satisfaction with doctoral training quality; - High degree of integration of the educational programme in the regional labor market; - High level of awareness of doctoral students; - Availability of an electronic database on the academic achievements of each doctoral student; -The availability of various types of information resources; - Availability of a developed university infrastructure for extracurricular activities of doctoral students; - Opening of the Student Service Center, which allows to solve quickly the requests of doctoral students in the learning process.	- insufficiently active participation of doctoral students in the development of the educational program; - Weak doctoral students' activity in academic mobility programs; - Absence of doctoral students studying on a commercial basis.
O (opportunities)	**T (threats)**
- Intensive development of enterprises of the Republic of Kazakhstan for production of mineral fertilizers, acids, salts and phosphorus; - Constant need of enterprises for highly qualified personnel; -A wide range of information technologies of training and possibility of their use in the educational process; - Active involvement of doctoral students in educational programme development; - Increasing the interest of enterprises and business structures to form partnerships with the educational environment; - The possibility of participation of doctoral students in internal audits.	- Increased competition in the market of educational services from universities in related specialties; - Increased competition from private universities in Kazakhstan.

2 QUALITY OF THE TEACHING STAFF

The main goal of the personnel policy is to implement the strategy of the university by involving staff. Principles of strategic management and personnel development have been developed, new methods and systems for professional development and retraining, development of regulatory and methodological materials for functioning the entire personnel management system are being implemented. The university applies the system of moral and material motivation of the university staff. Measures are being taken to improve working conditions and create favorable conditions for creative activity and career growth.

The university has adopted and approved the main regulatory documents defining the Quality Culture Policy. They are Charter of the University, the Internal Regulations, the Code of Corporate Ethics of SKSU, which establish uniform requirements for quality of performance of professional duties by teaching staff (TS) and university staff. These requirements are determined based on ethical standards and values of the university environment, convictions and aspirations of the authoritative part of the collective, expectations and demands of effective public practice, thereby ensuring the development of corporate culture and quality culture. In all training buildings and hostels, hotlines have been hung out and boxes for complaints and suggestions have been installed, the University's web site has a rector's blog which can be accessed by any teacher and employee. *Annex 8* shows the results of the survey "The satisfaction of teachers with the labor organization".

Corporate culture is a decisive factor in determining the effectiveness of the university (Corporate Code of Ethics of SKSU). In the context of corporate culture development, at the university great attention is paid to the work on introducing students to the norms and values of the university, their quick adaptation to the conditions of university life, traditions of the university; prevention of possible negative phenomena in student groups caused by interpersonal or inter-confessional misunderstanding; creating a cult of knowledge and stimulating students' interest in research work.

The University has created an effective system of selection and placement of teaching staff (TS), which allows for the career development of the teaching staff, to stimulate the rejuvenation of managerial personnel and improve their professional level. In order to reduce the staff turnover, a motivation system is applied: the activities of teaching staff are monitored, wage premiums, bonuses and moral incentives are established. Measures are being taken to improve working conditions, favorable conditions are set up for creative work and career growth.

The TS of CTIS department is staffed for EP implementation in accordance with the legislation of the Republic of Kazakhstan and the Rules of competitive replacement of scientific and pedagogical staff posts of higher educational

institutions. Doctoral students in the specialty "Chemical technology of inorganic substances" are trained by 6 doctors of technical sciences, 10 candidates of technical sciences and 3 PhD doctors. All teaching staff has a basic education that corresponds to the profile of the specialty disciplines taught, extensive experience in teaching and practical work, is systematically engaged in educational-and-methodical and scientific activities and participate in performance of financed research work and international educational grants (*Annex 11*). Of these, Professor Zhantasov K.T. is the laureate of the State Prize of the Republic of Kazakhstan, 13 teachers are holders of the title "The best teacher of the university". Many teachers have practical experience at industrial enterprises in EP area and in research institutes before to start teaching activities (*Annex 11*). Educational support staff of the department is 4 people with higher education. Tleuov A.S., professor of the department is the chairman of the dissertation council in "Chemical technology" area in specialties 6D072000 - CTIS and 6D072100 - CTOS, he is also a member of the Expert Council in the Committee on the Control of Education and Science of the MES RK. Sataev M.S. and Zhantasov K.T., the department professors are members of the dissertation council in "Chemical technology" area. Teachers of the department Seytmagzimova G.M., Tleuova S.T., Dzhanmuldaeva Zh.K., Koshkarbaeva Sh.T., Bolysbek A.A. are members of the section of the Republican educational-and-methodical council of MES RK on the CTIS EP at M. Auezov SKSU. Achievement of the planned learning outcomes is provided by a highly qualified teaching staff (*Annex 11*).

Improving the quality of education in doctoral studies is implemented according to the goal and objectives of the university through the modernization of the structure and updating the EP content in accordance with the results of the department scientific research, taking into account the needs of employers based on the interaction of science, education, public and private partnership.

In this direction, the department "Chemical technology of inorganic substances" has a significant potential: there are scientific schools on the chemical technology of inorganic substances; joint scientific work is conducted with professors from leading universities of near and far abroad based on memoranda of cooperation in the field of science and education; financed research works are carried out under the grants of the MES RK and under economic agreements with industrial enterprises (*Annex* 4). Doctoral students of the department are involved in the implementation of funded research in accordance with the doctoral thesis themes. The teaching staff performs research work on budget and financed research topics. 6 budgetary research works by the MES RK order are performed at the department:

- Research on the development and creation of innovative technologies for thermochemical enrichment and the production of mineral fertilizers and salts from natural raw materials and industrial wastes of various industries.

- Development of technology for complex processing waste from the chemical and petrochemical industries with mineral fertilizers production.

- Production of composite coatings of various functional purposes.

- Separation of dispersed systems at raw material enrichment and the production of inorganic compounds.

- Studies of phosphogypsum conversion into a balanced complex fertilizer and components of building materials.

- Research on the development of new technologies for complex fertilizers production based on phosphorus production and coal mining wastes, determination of the dependence of physicochemical properties of water-salt mixtures on the specific energy indicators of ions.

Topics of research carried out under the grants of the MES of the Republic of Kazakhstan and on economic agreements with enterprises, and the amount of funding are given in *Annex 10*. In 2014-2018 the department teaching staff participated in the management and implementation of 6 research projects financed by the MES of RK, and 2 contractual works commissioned by enterprises. In addition, the department teaching staff is involved in the implementation of two international educational projects: a) "Water harmony - integration of education, research, innovation and entrepreneurship" between the Norwegian University of Natural Sciences and universities of Ukraine, Belarus, Moldova, Kazakhstan and Tajikistan, the head is prof. Zhekeyev M.K., performer - Associate Professor Kadirbaeva A.A., b) “Promoting internationalization of research through the establishment of the Cycle 3 Quality Assurance System in Line with the European Agenda”; The leader - Nurmanbetov K.E., performers - Seitmagzimova G.M., Tleouva A.B. Earlier, an international grant project of the NATO Scientific Committee “Assessment of Transboundary Water Pollution in Central Asia” (headed by Professor Besterekov U.B.) (*Annex 11*) was carried out.

The department together with chemical enterprises established educational scientific-and-industrial complexes (ESIC) for joint training, which operate on the bases of "Kazphosphate" LLP Novozhambyl phosphoric plant (NDFZ) and Plant of mineral fertilizers (ZMU), Taraz city; “KazNIIKhimproekt” LLP, Shymkent city; “Kainar” LLP, Shymkent city; "RU-6" LLP, vil. Shieli; “As Dinar” LLP, Shymkent city; "KazAzot" LLP, Aktau city; “Kazzinc” JSC, Ust-Kamenogorsk city; SKZ-U LLP, Zhanakorgan city; KRK JV Zarechnoye, Otrar district, vil. Shawildir; "Taukentskoe Mining and Chemical Enterprise" LLP, vil. Taukent; "AXEMINVESTMENT" LLP, Taraz city. On the bases of educational scientific-and-industrial complexes, students are provided with a real opportunity to gain practical experience of professional activity on modern production equipment, developing the core competencies of doctoral students.

According to the research conducted results, the department teachers annually publish scientific articles in peer-reviewed journals of the RK, far and

near abroad. In *Annexes 11, 12 and 13* the information on publications of the CTIS department teachers and certificates on intellectual property protection for the last 5 years is presented. For 2014–2018, there is a positive dynamics of growth in the total number of publications, articles and abstracts of the department teaching staff in Kazakhstan and abroad. The department teaching staff published 84 articles in peer-reviewed scientific journals with impact factor, 23 monographs, 53 textbooks and study guides, 83 electronic books, 25 copyright certificates and innovation patents of the RK were received (*Annex 12*).

The university provides the necessary balance between educational and scientific activities of teachers implementing educational programmes. The balance lies in the rational distribution of study load and time for scientific work: several hours a day are allocated weekly for work in the library, in the department, in the scientific laboratories of the department. The documents defining the educational work of the teacher are following: distribution of the teaching load on the department, individual plans of teachers, the annual report on the implementation of the teaching load of teachers. For teaching staff, a shortened working time is established - no more than 36 hours per a week, within which teachers perform educational, methodical, research, and organizational-and-educational work.

The teaching load for the teaching staff is set at 750 hours per academic year. The study load is evenly distributed between teachers, taking into account the position and qualifications of each teacher by types of educational work. At the end of the academic year, each teacher makes a report on the work done with a detailed analysis of each activity. Teachers' reports are discussed at the department meeting with the HS dean participation and the supervising pro-rector. The scientific activity of the teaching staff is carried out by performing state budget, financed research works, supervising the research work of doctoral students and master students.

The university has all the conditions for working and maintaining the health of faculty and staff of the university. All teaching staff of the department is provided with computers and printers. There are catering points with a moderate price list, medical facilities, free sports and fitness sections and a swimming pool in training buildings. Free consultations of the university legal service are provided. The library and reading rooms provide open Internet access to world electronic databases. Wi-Fi hotspots are installed in all buildings. Sports and cultural events, various training seminars for teaching staff are organized. The department of labor protection and safety controls the labor safety conditions, organizes the training of workers in safety and labor protection. The rest in the sporting-and-health camp "Technologist", located in the picturesque gorge "Mashat", in rest houses and sanatoria "Burguluk", "Mankent", "Saryagash", "Merke" etc. is provided for faculty, staff and their families during summer vacation. The trade union committee provides for public control over the payment

of compulsory compensation and wage premiums, the employer's compliance with the Labor Code of the Republic of Kazakhstan and other facts containing labor law regulations and internal work regulations.

The system of financial stimulation for the teaching staff is used based on evaluating the effectiveness of their activities, taking into account criteria that allow to personally evaluate the performance and quality of their work. In addition, the system of monetary bonuses and rewarding faculty with medals, signs, certificates on holidays and significant dates for professional merit is applied.

Doctoral studies are conducted mainly in active creative forms, which allow the teacher to productively use the study time and develop students' analytical skills to solve problematic issues. Teachers widely use such interactive teaching methods as case-study, individual and group projects, business and role-playing games, solving problematic industrial situations, encountered in the working environment, discussions on the development of scientific projects, lectures-conferences. Such forms of conducting classes propose the preparation of doctoral students for classes, instill the skills of working with information sources, and actively participate in the discussion of a new topic. In this case, doctoral students act as leaders of mini-groups, form and defend their thoughts on the topic being studied, enter into debates with other doctoral students and then themselves assess the work of each doctoral student (*Annexes 14,15*). To enhance the interest of students in acquiring knowledge, the teaching staff widely uses the results of their research in the learning process, thereby updating the contents of elective disciplines and enriching the discipline with new scientific knowledge. Conducting classes is accompanied by the display and discussion of videos, presentations, implementation of creative tasks by doctoral students.

Tasks for independent works in the disciplines studied are issued to doctoral students in relation to the subject of the dissertation research; when the tasks completing the doctoral students acquire skills of preparation and conducting research and the formation of thesis sections. Thus, in the discipline "Management of research projects" doctoral students prepare and defend research projects on the topic of a doctoral thesis, which essentially helps in future during structuring of the thesis sections. Students perform an independent work on "Research Methodology" discipline in the form of an essay "Designing a Scientific Research" on the topic of a doctoral thesis, perform search work in electronic databases and analyze scientific information on a research topic, and also study an article from a scientific journal in accordance with the teacher’s task and prepare a review on this paper. It instills the skills of planning a research study, performing a theoretical analysis and preparing a scientific article for publication. For the preparation of an analytical review of the dissertation, conducting a theoretical study, doctoral students have free access to databases in the rooms of the educational-information center and in the department's computer office for doctoral students.

Teachers prepared and use presentations Power Point, training videos, electronic textbooks in the learning process: "Technology of production of phosphorus compounds", "Types of development of mineral deposits", "Study of the theory of work and charge-discharge characteristics of lead batteries", "Potentiostatistic method for studying the steel corrosion behavior". Laboratory works are mainly research in nature, part of works is performed in a virtual form (Obtaining double superphosphate, Production of wet-process phosphoric acid, Caustification of soda ash solution, Technology of yellow phosphorus and metal carbides, Technology of abrasive materials).

The department collaborates with leading foreign universities and scientific organizations in the field of chemical technology: D.I. Mendeleev Russian University of Chemical Technology, Moscow (Russian Federation); St. Petersburg State Institute of Technology, St. Petersburg (Russian Federation); Cardiff University (United Kingdom); V.G. Shukhov Belgorod State University (Russian Federation); Belarusian State Technological University, Minsk (Republic of Belarus); Scientific Research Institute of Chemical Technology, Tashkent, (Uzbekistan); Institute of General and Inorganic Chemistry, Academy of Sciences of Uzbekistan (Uzbekistan); M.V. Lomonosov Moscow State University, Moscow (Russian Federation). Cooperation with these universities provides for an opportunity to use advanced international experience in PhD doctors training and to attract competent foreign specialists to doctoral students' scientific management.

Invitation of scientists from leading universities of the near and far abroad to give lectures and provide consulting services to doctoral students is practiced annually. Professors of foreign universities participate in the implementation of joint research projects, they are co-authors of textbooks, study guides and monographs. Table 3 provides information about foreign scientists involved in the learning process for lecturing and advising doctoral students. The table identifies the topics of lecture classes held.

Table 3 - Information about foreign scientists involved in the learning process in doctoral studies

№	Full name	Country of arrival, name of the university or research institute	Degree, title	Work period	Type of module, lecture topics
1	Petropavlovsky Igor Alexandrovich	Russian Federation, Moscow, D.I. Mendeleev Russian University of Chemical	Doctor of Technical Sciences, Professor	7.12.2015 – 28.12. 2015	**Modules:** Modern Technologies for Compe[-mixed Fertilizers **Topics:** Graphic analysis of dissolution and crystallization processes using solubility diagrams in

		Technology			water-salt systems
				19.12.2018 -24.12.2018	**Modules:** Technology of nitric acid processing of phosphate raw materials **Topics:** Calculation of evaporation, dissolution and crystallization processes according to solubility diagrams in ternary and quatenary systems
2	Dmitrevsky Boris Andreevich	Russian Federation, Saint Petersburg, Saint Petersburg State Technological Institute	Doctor of Technical Sciences, Professor	26.10.2016 – 5.11.2016	**Modules:** Innovative technologies of inorganic substances **Topics:** Analysis of ammonia absorption processes by purified brine and carbonization of ammoniated sodium chloride solution
3	Javier Rodrigo Ilurri	Spain, Valency, Polytechnical University Valency	PhD, associate professor	16.10.2016 - 27.10.2016	**Modules:** Innovative technologies of inorganic substances **Topics:** Liquid and solid industrial waste and modern methods of processing. New methods of cleaning exhaust gases from chemical impurities
4	Heinrich lang	Germany, Chemnitz, Technical University Chemnitz	Doctor, Professor	20.10.2016 - 30.10.2016	**Modules:** New methods for producing composite coatings **Topics:** Materials and Chemistry, Organometallic Chemistry, Industrial Homogeneous Catalysis

Professors and associate professors of leading universities from the UK, Russian Federation, the Republic of Belarus and the Republic of Uzbekistan are foreign scientific consultants for doctoral students. A foreign scientific consultant provides scientific guidance based on an agreement concluded with a university and a doctoral student for a doctoral student's term of study; it is approved by the university rector order based on the decision of the Academic Council during the first two months after doctoral student enrollment. A foreign scientific consultant supports of doctoral student research for his internship at the work place of a consultant, provides consulting services on the dissertation research topic and the

preparation of scientific publications and theses for the defense. Information about foreign scientific consultants is given in *Annex 16*.

In order to ensure the quality of classes, there is a system of advanced training and professional development of the teaching staff functions. In accordance with the Law of the Republic of Kazakhstan "On Education", all teachers, at least once in 5 years, pass professional development, including in the specialty at the republican and international level, with obtaining certificates. Professional development of the teaching staff is carried out through short-term seminars, language courses and internships at leading universities and enterprises of Kazakhstan, as well as abroad, the results of which are being introduced into the educational process.

The results of professional development are used in the educational process in curricula development, the development of new elective courses and implementation of internship results in lecture and practical classes (*Annex 17*). Confirmation of the level of teaching staff competence is the effectiveness and quality of teaching, assessed by the department through open training classes, mutual visits of classes (*Annex 5*). The department teaching staff participate yearly in the Republican forum of teacher-innovators, held at the university. At the forum, teachers have an opportunity to attend lectures and master classes of teachers from other universities and learn from the experience of teaching and technology of student-centered education. Everyone can get acquainted with the innovative ideas of the forum participants in the collection of works.

SWOT- analysis of "Quality of the teaching staff" part

S (strengths)	**W (weakness)**
- Mutually beneficial cooperation of the teaching staff with core enterprises, national and foreign universities; - High qualification of the teaching staff; - Existence of scientific schools of CTIS department scientists; - The effectiveness of TS professional development; - Participation of scientists and EP doctoral students in projects funded by the MES RK and enterprises; - Training of doctoral students at ESIC, organized on the base of leading enterprises; - Information competence and proficiency of teaching staff to work with software products.	- Low activity of teaching staff in participating in academic mobility programs - Increase of average age of teachers involved in training doctoral students
O (opportunities)	**T (threats)**
- The possibility of rejuvenation of scientific-and- pedagogical personnel at the expense of graduates from doctoral EP; - Creating conditions for teachers' mobility and professional development in RK universities and abroad.	- Brain drain

3 QUALITY OF RESEARCH

The implementation of doctoral studies is carried out in accordance with the Legislation of RK and the Salzburg principles. The research work of doctoral students must meet the following requirements: to contain new scientifically-based theoretical and (or) experimental results that allow solving a theoretical or applied problem or being a major achievement in the development of specific scientific directions; to be based on modern theoretical, methodological and technological achievements of science, technology and industry, on advanced international experience in the relevant field of knowledge; to be performed using modern methods of scientific research, processing and interpretation of data and advanced information technologies; to contain, research, experimental research (methodical, practical) sections on the main defended positions.

The topics of doctoral theses were developed in accordance with the thematic plan of the research work of the department for 2015-2020, approved by the Academic Council of M. Auezov SKSU, and with scientific programs of fundamental or applied research financed by the MES RK. Doctoral research projects are devoted to the study of the composition and properties of domestic mineral and technogenic raw materials, the improvement and development of effective technologies for their processing. The topics of doctoral theses of the department meet the urgent problems of the development of chemical technology of inorganic substances, the current state of development of science, technology and the requirements of existing Kazakhstan's chemical industries. Topics of doctoral theses are given in *Annex 16*.

Topics and candidatures of doctoral research scientific supervisors are discussed at a meeting of the department, the Academic Council of the Higher School and the University, on the recommendation of which they are approved by the Academic Council, by a rector order during the first two months of study.

The implementation of scientific research is based on an interdisciplinary approach, which is ensured by the doctoral students' mastery the following disciplines during the first semester: "Research Methodology", "Optimization of Chemical-and-Technological Processes", "Management of Scientific Projects". The acquired competencies allow doctoral students to efficiently organize the research process, interpret experimental data, conduct mathematical processing of research results and substantiate the optimal technological mode of production of the object under study. The themes of some doctoral theses are performed at the intersection of sciences, for example, chemical technology of inorganic substances and petrochemistry, chemical technology of inorganic substances and industrial ecology, the use of technogenic waste for mineral fertilizer production.

All necessary conditions are created for doctoral students of the EP "Chemical technology of inorganic substances" in conducting research work in the framework

of the thesis, drafting the thesis and scientific articles, participation in international conferences and research internships. Doctoral students are provided with jobs in department's laboratories equipped with the latest equipment, instruments, reagents, raw materials and personal protective equipment. The material and technical base of the department is permanently updated and developed. The sponsorship of the employer, "Kazphosphate" LLP, plays a significant role in this. Doctoral students have an opportunity to conduct research in the accredited laboratory of physicochemical methods of analysis "SAPA" and Testing Regional Engineering Laboratory "CBM" of M. Auezov SKSU. Doctoral students use the bases of ESIC, scientific research institutes and research centers to conduct experimental research and approbation of results under industrial conditions. To ensure doctoral students in creating high-tech technologies, innovative projects and productions, it is provided doctoral students to be involved in the implementation of grant research projects and contractual projects at the department with a part-time employment (*Annex 10*). The head of a funded research project provides a support for a doctoral student - he pays for the article publication in a foreign peer-reviewed journal at the expense of funds invested in the project.

Within the DSRW framework the individual work plan of a doctoral student provides for passing a research internship at a foreign university where the scientific consultant works (*Annex 18*). The research internship is a compulsory component of the PhD doctoral programme, which allows doctoral students to collect new theoretical and practical information on the latest scientific developments of foreign scientists, to test the results of their research in the course of presentations and reports to foreign scientists specializing in the field of chemical technology of inorganic substances, to participate in scientific conferences, as well as to publish the results of their research. The costs of doctoral students for overseas internship are allocated from the national budget. In the period from 2014 to 2018 ten doctoral students have completed an internship. Information on overseas internships of doctoral students is given in *Annex 18*. The number of graduates in CTIS EP for 5 years is given in *Annex 19*.

The main results of doctoral theses performed during the reporting period are published in the form of patents and articles on the thesis topic, including these in scientific journals recommended by the Committee on the Control of Education and Science of MES RK, and in international scientific journals from informational database Thomson Reuters (ISI Web of Knowledge) with non-zero impact factor or included in the Scopus company database, and in Proceedings of international conferences. The final result of the research / experimental research work of a doctoral student is the implementation and defense of a thesis for the degree of Doctor of Philosophy (PhD).

Doctoral students, as well as other university users, are provided with free on-line access to full-text multidisciplinary databases "Springer Link", "Scopus",

“Plenipotentiary”, “Thomson Reuters ISI Web of Knowledge”, “Science Direct”, “Lan” “EBSCO ", to the electronic versions of scientific journals (on the platform of the Scientific Electronic Library), to the Kazakhstan’s databases "KazPatent", "Epigraph ","Zan", "RMEB". Library staff regularly conduct training workshops for doctoral students on working with the international systems of scientific citing Web of Science (ISI Thomson Scientific) and Scopus (Elsevier).

The University provides support to doctoral students in the creation of start-up projects through training, promotion and opening companies. The Research Department regularly conducts seminars on the preparation of research projects for competitions, training sessions on scientific citation databases use, teaching academic writing skills and writing and submitting articles for publication in peer-reviewed scientific journals.

The university has a system of certification and evaluation of the research work of doctoral students (DSRW), conducted in the framework of approved individual work plans, which is governed by internal teaching and methodological documents (Guidelines for the organization of doctoral programs and the implementation of the research work of doctoral students of the specialty 6D072000 - Chemical technology of inorganic substances", Guidelines for internal quality assurance in doctoral studies). Individual work plans are drawn up under the guidance of scientific consultants and generally regulate the doctoral student’s research process. An individual work plan for a doctoral student is drawn up for the entire study term and includes the following sections: 1) an individual study plan (IEP); 2) research work (justification of the relevance of the research topic, the research work structure, deadlines and a reporting form by semesters); 3) pedagogical and research practice (individual assignment, practice base, deadlines and a reporting form); 4) doctoral dissertation implementation plan; 5) a plan of publications and internships, including foreign ones.

The main tasks of monitoring are to assess the work of doctoral students, review the implementation of the doctoral student’s individual plan, determine the actual state of the dissertation research and its compliance with the requirements for doctoral theses, as well as develop proposals for adjusting the organization of research to achieve the best results. The control of doctoral student research work provides for current monitoring the progress of its implementation by the scientific consultant.

The current control is performed by the department for the academic year and provides for a written report on the research results with its discussion at the department meeting. The research results are issued every semester in the form of written reports on DSRW performance, which are approved by the supervisor. The analysis of DSRW performance is carried out on the basis of certification at the end of each semester with a rating on a scale of 49-100 points. The DSRW results are discussed at the scientific and technical seminar of the department with the

presentation of doctoral current results and at the Scientific and Technical Council (STC) of HS “Chemical Engineering and Biotechnology”. The doctoral student also presents and defends a report on the results of foreign research internship at the STC meeting. The department is responsible for ensuring the research work of doctoral students with the necessary laboratory, technical and information resources and continuous current monitoring of the research work conducted.

At the end of the academic year, the attestation commission makes a decision on the doctoral student certification and transfer to the next year of study or admission to the final state attestation. The final control of doctoral student research is carried out in the form of doctoral thesis defense.

The supervision of doctoral student research is carried out by domestic and foreign scientific consultants (at least two people) from among doctors and candidates of science, doctors of philosophy (PhD) with work experience after defending a thesis for at least 5 years, who are actively engaged in research in the field of chemical technology of inorganic substances, have scientific publications over the past 5 years in national scientific journals recommended by the Committee on the Control in Education and Science of the MES RK and in international scientific journals with a non-zero impact factor according to the information database of the Web of Knowledge, Thomson Reuters, or those included in the Scopus database. If necessary, consultants in related fields of science can be appointed for doctoral students (for example, consultant Beisesebayev O.K. in the specialty “Chemical technology of organic substances”, consultant Shevko V.M. in the specialty “Metallurgy”, consultant Taymasov B.T. in the specialty “Chemical technology of refractory, non-metallic and silicate materials") (*Annex 16*).

Scientific consultants are required to:

- monitor the implementation of the doctoral thesis and doctoral research work according to the schedule of consultations;
- to provide feedback on the doctoral dissertation implementation (on semester - domestic consultants, on annual - domestic and foreign consultants);
- give assistance in the passage of foreign scientific internships;
- discuss the results obtained with a doctoral student;
- correct scientific articles, abstracts of reports;
- give assistance in the publication of doctoral research papers in scientific journals;
- provide methodical assistance in writing a doctoral thesis.

The university pursues a policy of developing an anti-corruption ideology and behavior among students and teachers in order to ensure informational transparency and accessibility of educational services, integrity in research and processing of research results. Doctoral students at M. Auezov SKSU have rights and obligations defined by the Law of the Republic of Kazakhstan "On Education",

"On Science", normative acts of the MES RK, the Charter and the Internal Regulations of M. Auezov SKSU. Doctoral students have the right to apply to the head of the graduating department for assistance in finding scientific supervisors, consultants and for solving other organizational issues.

Doctoral students are required to timely and efficiently perform all types of work provided for by the individual working plan; at the end of each stage of the work provided for by the individual plan, to submit in timely all the necessary written materials. Doctoral students must:

- speak at scientific-and-methodical seminars at the higher school level;
- observe the positions of the European Code of Research Conduct (The European Code of Conduct for Research Integrity);
- discuss in time with scientific supervisors, consultants and advisors any problems that arise, take initiative in solving them;
- complete at the stated time the writing of a doctoral thesis.

The policy of academic integrity is an integral part of the educational process. Its provisions are in close accordance with the Mission and the Academic Policy of M. Auezov South Kazakhstan State University. The rules of observance of academic integrity by students, teaching staff and staff at M. Auezov SKSU, developed in accordance with the University Development Strategy and Charter of SKSU, establish principles of academic integrity in the educational process, the rights and obligations of members of the university community, determine the types of violations of academic integrity, and the procedure for taking action in the event of their occurrence. "The rules of academic integrity of M. Auezov SKSU" are approved by the Academic Council of the University (Minutes of the meeting No. 3 of 30.10.2018). The tools to ensure academic integrity are following:

- automation of processes related to the knowledge assessment, tracking of attendance, movement of contingent, excluding the influence of the human factor;
- organization of the system of internal work with students (advisors, deans office, registration office, department on educational work and youth policy), organization of a feedback system (rector's blog, trust boxes, student council);
- anti-corruption policy, which is an important element of the university's policy: support for anti-corruption measures, accessibility of the university administration, HS for teaching staff and doctoral students, flexibility in responding to inquiries.

Theses for the degree of Doctor of Philosophy (PhD) are subjected to preliminary defense at the department and checked for the degree of borrowing by doctoral students of the published results on the Antiplagiat program at the National Center for State Scientific and Technical Expertise (NC SSTE). Doctoral theses are defended at a meeting of Dissertation councils, the composition of which is approved by the authorized body in the field of education.

Doctoral dissertation defense is carried out in the presence of:

- positive feedback from scientific consultants;
- positive certificate of anti-plagiarism from NC SSTE;
- at least 7 scientific publications, including 3 publications on the thesis topic in scientific journals recommended by CCES of MES RK, 1 publication in an international scientific journal with a non-zero impact factor according to the information database of the ISI Web of Knowledge, Thomson Reuters or incoming to the Scopus company database, 3 publications in proceedings of international scientific conferences, including 1 publication in materials of foreign conferences;
- extracts from the minutes of the graduating department meeting on recommendation for defense;
- two reviews containing a comprehensive description of the dissertation of official reviewers and a reasoned conclusion about the possibility of awarding the degree of Doctor of Philosophy (PhD).

The general organization and control of the doctoral thesis defense, as well as the monitoring of the work of dissertation councils are carried out by the Research Department of SKSU.

SWOT- analysis of "Quality of research" part

S (strengths)	**W (weakness)**
- Participation of scientists and doctoral students of the University in projects funded by the MES RK and industrial enterprises; - Mutually beneficial cooperation of the teaching staff with relevant enterprises, domestic and foreign universities; - High publication activity of the teaching staff; - High degree of integration of scientific and educational processes; - Preparation of doctoral students at ESIC, organized on the basis of leading enterprises; - - Developed laboratory base for the research.	Not sufficiently high percentage of research projects of the teaching staff which won scientific competitions for grant financing of the MES RK; Low activity of TS in the implementation and commercialization of scientific research
O (opportunities)	**T (threats)**
- Intensive development of enterprises of the RK on the production of mineral fertilizers, acids, salts and phosphorus; - Increasing funding for the research.	- High competition in the scientific community in the priority direction "Complex use of mineral raw materials" in competitions for grant financing of the MES RK

4 EFFECTIVENESS OF DOCTORAL STUDENT SUPPORT SYSTEM

The Department “Chemical Technology of Inorganic Substances” determines a general list of dissertation research topics with annual update in accordance with the direction of the department research work and performed research, assigns a supervisor and a foreign consultant for each doctoral student in the first two months of training. Foreign scientific consultants are selected in accordance with the direction of scientific research from among the professors of leading universities in the near and far abroad (*Annex 16*). The decision to replace the scientific consultant of the doctoral candidate, the appointment of consultants in related fields of science, etc. is adopted by the University Academic Council on the graduating department submission. Topics of doctoral theses, presented by the supervisor, are discussed at the scientific and methodical seminars of the department and the Higher School. Formed topics of doctoral theses are discussed and corrected at the STC of the HS and University and recommended by them for approval at the Academic Council of SKSU.

Over the entire training period, doctoral students have the opportunity to use the resources of supporting services: Registration office, Advisory service, Young scientists council, Employment department, Center for international cooperation, Center of bologna process and academic mobility, etc. In the process of implementing educational programs, students have the opportunity to complete a semester in a foreign university – a partner or an international internship.

Foreign students are given the opportunity to study in free language courses organized by the Language development department of SKSU. The doctoral adviser provides support for doctoral students transferred from other universities during the inter-semester vacation, provides organizational and academic assistance. For organization of inclusive education and training of employed doctoral students, online communication with a scientific consultant and a lecturer is provided both during the classes and in another time at the request of doctoral students. For students with disabilities, a tutor is provided to help them over the entire period of training in doctoral studies not only on educational and social issues, but also organizes consultations and trainings with a psychologist to ensure a quick adaptation of a doctoral student in a team.

To provide support for students with disabilities, an individual approach is applied to all their activities. In the framework of inclusive education, distance learning methods are used when a doctoral student participates in classes online via Skype. Implementation of group research projects is also specified to involve a student with disabilities into the work of doctoral students’ group. All textual teaching materials for the educational process are posted on the "Professor" portal and can be scaled up to facilitate their use by students with disabilities. Such doctoral students are given the opportunity to choose the type and form of passing

the current and intermediate control, to obtain a facilitated assignment for independent work.

The Educational Information Center (EIC) within the framework of inclusive education provides the following educational conditions for people with disabilities: the possibility of increasing the text on the website is used, home students can get a virtual consultation of a librarian on the use of information resources. In November 2017, a cooperation agreement was signed with the Library for Blind and Visually Impaired Citizens for joint activities and access to specialized funds.

In the process of EP implementation, students are given the opportunity to study during a semester under the program of external and internal academic mobility in one of the universities of Kazakhstan or near or far abroad. Employees of the Bologna Process and Academic Mobility Center of the SKSU select a university for the student and a program that corresponds to the direction of doctoral studies, assist in obtaining the necessary documents and visas, and organize the transfer of credits after graduating from the university. The Center for International Cooperation invites all students to participate in the Bolashak program and in other scholarship programs in the direction of scientific internships at foreign universities. Recognition and award of credits, mastered by a doctoral student during academic mobility, is organized by a Registrar's office.

The university has an effective system for consideration and resolving student complaints and appeals. Doctoral students have the right to contact the head of the graduating department for assistance in finding scientific supervisors, consultants and for solving other organizational issues. In the event of conflicts between a doctoral student and his/her consultant, the doctoral student has the right appeal to the conciliation commission to resolve controversial issues. If necessary, the university Academic Council may decide on scientific supervisor removal from the management and the appointment of a new scientific supervisor for a doctoral student.

All controversial issues arising in the implementation of doctoral educational programs are resolved in the manner established by the legislation of the Republic of Kazakhstan. Administration of complaints of doctoral students by the top management of the university is implemented:

- when regular meetings of the rector with doctoral students;
- through the open personal blog of the university rector;
- through appeal commissions during examination sessions;
- through the application of doctoral students to the university administration on visiting days and hours.

Complaints and claims of doctoral students, obtained as a result of an anonymous survey and during meetings with the university administration, are compulsory recorded, and the information is analyzed at various levels of the

university (advisors - department - dean's office / HS - vice-rector - rector), after which appropriate decisions are made.

Throughout the entire period of training, doctoral students have been given the opportunity to use the resources of supporting services: the registration office, advisory service, Young scientists council, Employment department, Center for International Cooperation, Center of Bologna Process and academic mobility, etc. All the staff of the Center of Bologna Process and academic mobility and the Center for International Cooperation of the SKSU are fluent in English at a level sufficient for contacting representatives of foreign universities on the organization of student mobility, to hold doctoral students' meetings with foreign professors.

The CTIS department involves the most highly qualified teachers and scientists in the educational process in doctoral studies. The department provides the educational program of doctoral studies with practice bases with highly qualified supervisors of research practice and scientific internships.

The effectiveness of doctoral studies support services is assessed by questioning the students' satisfaction with the quality of the organization of the study process. The Department of Strategic Development and Quality Management after the end of each semester conducts a survey of students in order to reveal problems and improve the quality of doctoral training. Thus, the service in the university library and the efficiency of work in the Internet is assessed as a whole positively (64.7% of doctoral students are completely satisfied with the library staff service, 23.5% of these are partly satisfied). Doctoral students answered similarly to the question about effectiveness of work in the Internet (*Annex 7*).

SWOT-analysis of "Effectiveness of doctoral support system" Part

S (strengths)	**W (weakness)**
- The demand for doctoral candidates at the labor market; - Provision of doctoral students with material and laboratory facilities for scientific research, with information resources of the university's supporting services; - Availability of internal regulatory documentation on the areas of the educational process (rules of admission, training, rules of assessment, transfer from a course to a course, etc.); - Presence of own information base on the organization and control of the educational process; - Objectivity and transparency of the process of controlling mastering the knowledge by doctoral students through the Information system ISVUZ - Availability of an effective system of doctoral appeal consideration.	- Absence of commercially trained doctoral students
O (opportunities)	**T (threats)**
- Support for doctoral students in employment	-High competition in the educational market

5 RESOURCES

Educational activities of M. Auezov SKSU is performed in conditions of developed material resources. The material and technical base of the university provides for all types of laboratory and practical classes, research work of doctoral students, provided by the curriculum, and meets the current sanitary and technical standards.

Educational program 6D072000 - Chemical technology of inorganic substances has the material and technical facilities that meets the requirements of the educational program, it is equipped with the necessary classroom fund, educational laboratories, and computer classes. In 2017, the department opened a computer class for teaching and performing the theoretical part of doctoral research, based on the fund of the Erasmus+ program in which teachers of the department participate in the implementation of the International Educational Project C3QA. The office has 10 stationary computers, 2 multifunction devices, a projector and 3 laptops. The equipment is used for conducting lecture and practical studies of doctoral students, to carry out search analytical work in the Internet resources and information base of the university. The department Scientific seminars are held in the office, at which doctoral students report on the work fulfilled for the semester and during the certification period.

The material and technical facilities of "Chemical technology of inorganic substances" department covers an area of 431 m^2 and includes 9 laboratories:

- Laboratories of chemical technology of inorganic substances - rooms 310A, 312A, 311A, 320A.
- Laboratory of technology of electrochemical production, room 329A.
- Accredited in 2018 laboratory "Synthesis of multicomponent mineral fertilizers" for training of master and doctoral students, room 331A.
- Research laboratory "Synthesis of multicomponent mineral fertilizers" and a pilot plant, room 118 B.
- Accredited in 2018 laboratory "Technologies of inorganic acids and salts" for for training of master and doctoral students, created as a laboratory of cooperation of the CTIS department and “Kazphosphate” LLP, room 126 AB. The company provides a great support in equipping the laboratory: the laboratory presents all products of “Kazphosphate” LLP and raw materials used in various industries, stands with the information necessary to perform laboratory research. The company supplied chemical glassware to the laboratory, as well as a computer and a multifunction device.
- Sh.M. Moldabekov research laboratory for master and doctoral students named after, room 316 A.

In 2018, the laboratory named after the founder of the CTIS department Seitmagzimov A.S. was opened, room 308A.

Laboratories are equipped with personal protective equipment, first-aid kits, fire extinguishing equipment (fire extinguisher), equipped with exhaust cabinets. The laboratories have necessary devices and equipment for performing laboratory scientific experiments. A pilot plant was installed with a capacity of up to 100 kg/h to produce complex-mixed mineral fertilizers of prolonged action, including a grinding complex, a screw mixer, a granulator, a rotary drum furnace and an emulsifier reactor.

In addition, there is a special research laboratory “Monitoring the quality of water and water resources of the RK”, which is equipped with the modern “Analyst 800” spectrometer with the PCD 650 multiparameter chipper scanner and the Arium-6131 reverse osmosis unit to determine more than 10 toxic elements in natural waters and industrial waste water.

Teachers and students have also the opportunity to conduct research in the accredited laboratories of the university: Laboratory of Physical and Chemical Research Methods named after Academician S.T. Suleimenov "SAPA" and Testing Regional Engineering Laboratory «Constructional and biochemical materials» (TREL “CBM”). Laboratories are equipped with up-to-date equipment and devices that are checked annually, which ensure the accuracy and reliability of research results. Students can use the services of research institutes and research centers to perform dissertation research.

Computing equipment and software products are used in educational and scientific processes (*Annex 20*), equipment and up-to-date devices, which are checked annually, which ensure the accuracy of experimental data. A list of devices and equipment is given in *Annex 21*. Doctoral students use all available tools both for laboratory work on the modules under study and for conducting research on the thesis topic.

Laboratories use software tools such as:

- software for the device "Photometric sedimentometer";
- software of a computer device MFP PSC-K for determining the specific surface of solid particles and gas permeability;
- atomic absorption spectrometer with software;
- spectrometer "Analyst 800" with multiparameter chipper scaner PCD 650;
- software for the device "Potentiostat-galvanostat" for conducting electrochemical processes.

The material and laboratory base is updated annually in accordance with the public procurement plan and through sponsorship of partner enterprises. The annual supply of the department laboratories with chemicals and chemical glassware amounts to more than 1 million tenge. In 2015-2016, the laboratory and instrumentation base of the CTIS department was significantly updated through the acquisition of equipment and instruments for a total amount of 95,807,600 tenge. The total funding of the EP in 2014-2018 is 106 639 600 tenge (*Annex 22*). In

addition to the list of equipment and devices listed above (section 7.3), managers of funded research projects acquire, at the expense of project funds, the equipment necessary to perform research, which can be used by doctoral students to carry out research on the thesis topic.

Information-and-educational portal “Professor” (www.portal.ukgu.kz) provides information about the educational process at M. Auezov SKSU.

A student can get following information on the "Reference Book Guide" portal in the "Information for a Student" mode:

- Personal data – a mode of viewing the student's personal data;
- Lists of classes - a mode of obtaining information about the disciplines of their group by semesters;
- Performance – a mode of obtaining information about exams; exam dates, points, grades and credits on disciplines;
- Rating - a mode of viewing the ranking of progress by intermediate weeks and the final week, as well as the results of practice;
- Exam schedule of the current semester - a mode of viewing the exam schedule for this group for the current semester;
- Exam schedule - a mode of viewing the exam schedule by semesters;
- Group study passport - a mode of viewing the exam results of the entire students’ group by selecting the desired semester;
- Educational-and-methodical complex of disciplines (EMCD) - in this mode, a student, having chosen the desired discipline, can get syllabuses, tests, exam questions in this discipline.

To provide operational information to users and provide remote access to electronic educational resources, professional databases and information reference systems, the reading rooms and electronic resource centers of the university (total number of seats - 200) are equipped with Internet access zones (free Wi-Fi access zone).

For the convenience of users in the Education and Information Center (EIC), the actual full-text databases of own generation “Proceedings of the teaching staff of M. Auezov SKSU", "Electronic Archive", "AlmaMater" are combined into a unified search system and include 17,765 full-text documents. On-line access to the following databases has been opened: SpringerLInk, Scopus, Polpred, Thomson Reuters ISI Web of Knowledge, ScienceDirect, Lan, EBSCO and to Kazakhstan databases: KazPatent, "Epigraph", "Zan", "RMEB". The EIC provides its users with 3 options for accessing their own electronic information resources: from the “Electronic Catalog” terminals in the catalogs’ hall and EIC divisions; through the university’s information network for faculties and departments; remotely on the library web site http://lib.ukgu.kz/.

The Electronic Catalog (EC) of the EIC reflects the book fund from 1998 to the present, increasing annually by an average of 15,000 entries (including bibliographic

records retro-input). EC consists of 9 databases: "Books", "Articles", "Periodicals", "Works of SKSU teaching staff", "Rare books", "Electronic Fund", "SKSU in print", "Readers", "SKO". The total volume of EC is **208364** bibliographic records. The automated library information system IRBIS-64 operating at the EIC provides an access to full-text collections.

The library site http://lib.ukgu.kz is an important mean of providing users with information. The EIC website has a modern interface and provides users with a set of necessary services. An access to the electronic catalog and databases, electronic bibliographic products of the library, etc. is organized. Virtual exhibitions provide an opportunity to open the fund through a public demonstration on the Internet using web-based technologies. The EIC website is fully adapted for mobile devices, which allows increasing the number of visits and mobility. The abilities to share news and announcements in social networks (Facebook, Instagram, VK) are added.

Thus, the conditions are created in the EIC when the user can get a part of the information and documents he needs without coming to the EIC. This is relevant because most of our students prefer to work remotely. The state of the material and technical base is an indicator of the effectiveness of the EIC activities. The core of the EIC network infrastructure is 202 computers with Internet access. For readers, 186 workstations, 14 laptops, 6 interactive boards, 2 plasma TVs, 2 video systems, 1 video conference system, 9 scanners, 3 high-speed A-3 scanners, 21 printers are equipped. Software of EIC includes AIBS "IRBIS-64" under MS Windows (basic set of 6 modules), stand-alone server for uninterrupted work in the IRBIS system.

SWOT-analysis of the "Resources" Part

S (strengths)	**W (weakness)**
- Modern material and technical base (equipment, devices, computer equipment); - Availability of an automated information system ISVUZ, an educational portal; - Availability of a universal library fund and electronic databases providing the needs of doctoral students and teachers; - Availability of up-to-date multi-functional library information system (Electronic Library and Electronic Catalog) based on international standards and software and hardware; - Open access to information: Wi-Fi library coverage, open (including remote) access to printed and electronic resources of the EIC, library web site.	- The rapid pace of obsolescence of material and technical base, computer equipment
O (opportunities)	**T (threats)**
- Ensuring the educational process with teaching materials through the electronic library system, a full transition to electronic educational publications	- Inflationary processes that lead to a constant increase in the cost of material and information resources

6 EFFECTIVENESS OF LEARNING OUTCOMES ON THE PROGRAMME AND PUBLIC INFORMATION

The control of doctoral students training quality is conducted in accordance with the State obligatory standards of higher and postgraduate education (Order No. 604 of October 31, 2018) and QMS SKSU PR 8.06–2015 procedure "Managing the process of current performance monitoring, intermediate and final certification".

Doctoral students' progress is monitored in a rating form, which allows continuous monitoring the doctoral students' work for a semester and more precisely differentiate the assessment depending on the level of acquired knowledge and skills. This promotes to ensuring the regular and purposeful independent work of doctoral students on mastering the curriculum, provides an opportunity to continuously monitor the performance of doctoral students and teachers, improve the quality of education and reinforce the knowledge of doctoral students. To assess the study achievements of doctoral students, various forms of control and certification are provided - current control of doctoral students' progress, midterm control, intermediate and final evaluation, the frequency and duration of which is determined in accordance with the curriculum, academic calendar and professional training programs.

The duration of the periods of final control - examination sessions and the number of exams is determined in accordance with the approved working curriculum of the educational program and the academic calendar. IPE is responsible for the organization and conduct of examination sessions. The schedule is approved by the Vice-Rector for Academic and Educational-methodical work and is communicated to students and teachers no later than two weeks before the beginning of the examination session.

The results of the current monitoring of academic performance and intermediate evaluation of students' knowledge are discussed at department meetings, the Academic Council of HS and at meetings of the Dean's hour, which resulted in proposals to improve the educational process for the University Academic Council. The performance of doctoral students of the educational program 6M072000 - CTIS is 100%.

Evaluation of results of students' practice internship is equal to the estimates for theoretical training, taken into account when calculating the total GPA and transfer students to the next year of study. The final grade on practice is set according to the results of the student's report defense on the internship and consideration of the review and professional characterization submitted by the practice supervisors.

Current control of doctoral students' research work is carried out by scientific supervisors of doctoral students. For grading current control the research results are issued by doctoral students at the end of each semester in the form of a report. The number of credits allocated for research implementation in a particular academic period, is determined by the working curriculum of the educational program. A doctoral student who has fulfilled all the requirements of the state compulsory educational standard and who has mastered the established number of credits by component (compulsory and elective) for the entire period of study, is allowed to the final state evaluation.

Final evaluation of doctoral students is carried out in the form of doctoral thesis defense. The dissertation should serve as evidence of the applicant's deep knowledge in the research area, the formation of theoretical thinking skills, the ability to form hypotheses and to collect information. The research activity of doctoral students is evaluated on a set of several objective criteria: scientific erudition, professionalism, theoretical and applied significance of the research.

Academic performance of doctoral students, assessment of influence factors and methods of its improvement are discussed at meetings of the CTIS department. Based on the analysis the changes are made to the process of educational and scientific work related to the use of modern teaching approaches based on the strengthening of the professional orientation. Results of the educational program implementation, analysis of the achieved learning outcomes, comparison with the expected learning outcomes are annually subjected to self-examination and analysis by the university management within the QMS framework according to agreed criteria and compared with the results of other educational institutions.

Graduates of doctoral studies have the skills to systematize and analyze scientific information, to design and independently carry out their own research using up-to-date methodology. After dissertation completion, doctoral students are able to scientifically substantiate and defend the results of empirical research, to carry out tests of the developed technologies of inorganic substances at acting industries.

The main provisions of the doctoral thesis are reported at regional and international conferences, published in peer-reviewed scientific journals. Intermediate evaluation of a doctoral student at the end of each semester is an effective control of the level of learning outcomes achievement, that promote to assess the implementation of an individual working plan. Doctoral thesis is the final result of the doctoral student research and the criterion for the quality of their scientific training. Doctoral thesis defense is a form of state control over the compliance of conducted doctoral research with requirements for doctoral candidate's graduation work.

To ensure the competitiveness and relevance of EP graduates at the labor market, the learning outcomes as formed competencies at graduates meet the

requirements of the industry qualifications framework «Chemical production», approved by minutes No. 1 of the meeting of Branch commission on Chemical Industry of August 16, 2016), qualification reference book of professional positions and needs of the labor market, which are formed at the request of main consumers of the program and correspond to the national qualifications system. The effectiveness and quality learning outcomes of EP are confirmed by the demand for specialists at the labor market (employability of graduates is 100%), career growth of graduates of doctoral studies, positive dynamics in the conclusion of partnership agreements with enterprises of the RK.

To automate the educational process and management, the systematic data collection and analysis an own integrated university management system (ISVUZ) asu.ukgu.kz. is used at the university. ISVUZ is a system that brings into an unified information database the data of all components of the study process: teachers, students, curricula and schedules of the study process of specialties, information on current and final ratings, data on attendance and scores of the final control in all disciplines in the study semester, points on attestation for the implementation of research work of doctoral students in each semester, according to the results of which the doctoral candidate is allowed to defend a thesis. Programmes of reports and analysis with information about the study process in various combinations and sections have been developed. With ISVUZ introduction, the university's study process has become more transparent and controlled from various points of entry into the system - by the university management (administration, academic affairs department, registration office, institute of postgraduate education), teachers and students.

The supervisor is completely responsible both for the level of theoretical training of the doctoral student and for the dissertation timeliness, as well as for its contents. Scientific consultants create all the necessary conditions for the students' research: to provide an access to the necessary sources and resources; to help and provide for consultations in the dissertation research implementation; to provide, if necessary, for conducting the research work of students in third-party educational and scientific organizations, including well-known world centers; to assist in the preparation to publish the research results; resolve other issues arising in the course of the research.

The SKSU has an association of university graduates, organizing interaction with graduates and employers in the area of improving the quality of specialists training. The department "Chemical technology of inorganic substances" constantly conducts postgraduate support for graduates, monitoring the portgraduate activity, providing employment in the specialty, monitoring the implementation of a doctoral thesis in a case of untimely protection. One year after graduation from a doctoral program, an applicant who has not defended his thesis in time, is invited to re-submit his/her dissertation at a department scientific-and-

technical seminar until he receives a recommendation for thesis defense. Most of graduates of doctoral studies are universities' lecturers in the field of "Chemistry and Chemical Technology", including these in our university, some PhD doctors work at industrial chemical plants.

SKSU provides information on the educational program, expected learning outcomes, the teaching staff, students'contingent, training and employment opportunities through the official website of the university www.ukgu.kz and pages in social networks, the "University" newspaper, through city, regional and republican mass media scientific journals published.

In the "News" section on the university website, the latest information on events, achievements of the university, including CTIS Department is published. The University's website publishes a list of doctoral specialties, rules for admission to doctoral studies at SKSU, the procedure for documents submission for admission to doctoral studies, and the procedure for conducting entrance examinations, documents on scientific activities, university international communications, electronic-and library resources. The information is presented in Kazakh, Russian and English. Information on educational programs is published on the page of the department of CTIS, it is actualized yearly according to changes. Informational-and-educational portal www.portal.ukgu.kz provides real-time information for students on academic performance in all current disciplines of the semester, exam schedule., There is EMCD module as a part of the ISVUZ, which allows students to use metadata, such as syllabus, guidelines for coursework, laboratory and practical work, examination materials, etc. An official site of "Chemical Engineering and Biotechnology" Higher School (http://xt.ukgu.kz/ru) contains information on CTIS department including teaching staff.

The university's website contains announcements on upcoming thesis defense and annotations of dissertations. After defending a thesis, the full text of the doctoral thesis is stored in the university library. The University's website publishes full information on Dissertation councils of SKSU: position, composition of the dissertation council, annual work reports, video recording of the defense procedure, etc.

The dissemination of information on the results of functioning the internal quality assurance system, internal and external evaluation is implemented through the following channels:

- through the official website of the university www.ukgu.kz and pages in social networks;
- through exhibitions held at the university, graduate fairs, conferences, round tables, forums, and other events;
- through the coverage of the university's activities in the regional and republican mass media: use of own television studio, printing house, the "University" newspaper, scientific journals published, annual holding Open Days

at faculties, social networks, cooperation with media representatives, with government institutions of the region, participation of top management in the discussion of current issues on television and radio.

Informing the public on the results of doctoral students' work in carrying out research on the thesis topic is implemented through research publications in peer-reviewed journals with impact factors and in publications from the list of the CCES of the MES RK, in the proceedings of international and republican scientific conferences, testing the research results in reports on conferences and seminars, through industrial tests at operating industrial enterprises. The contents of the educational program "Chemical Technology of Inorganic Substances" is discussed at a meeting of the Committee on innovative technologies of training and methodological provision of HS of Chemical Engineering and Biotechnology (Minutes No. 10, 05.15.2018), reviewed by representatives of employers' enterprises, by an expert commission and approved by the University Council (Minutes No. 14, 29.08.2018). Reviews and expertises are attached (*Annex 2*).

The external quality assessment of the doctoral educational program "Chemical Technology of Inorganic Substances" is confirmed by the specialized accreditation of the Independent Agency for Quality Assurance in Education (IAQAE) for compliance with the standards criteria.

SWOT-analysis of "Effectiveness of learning outcomes on the program and Public Information" Part

S (strengths)	**W (weakness)**
- The demand for doctoral candidates at the labor market; - Doctoral student employment - 100%; - Improvement of EP and study process in doctoral studies on the basis of systematic assessment of the educational achievements of doctoral students; - Objectivity and transparency of the process of controlling the mastering of knowledge by doctoral students through the ISVUZ automated information system; - High level of doctoral performance from admission to graduation; - High degree of satisfaction of students with the quality of EP implementation; - Informing the public on the university work through the mass media, image products, the University official website; - Systematic interaction of the university with the republican, regional and city mass media; - Exhibitions, graduates' fairs, conferences, round tables, forums at the regional and republican levels	- Weak lighting and advertising specialty in the media abroad; - Insufficient popularity of the university among users of social networks.

held at the university.	
O (opportunities)	**T (threats)**
- Support for doctoral students in employment; - Possibility of career growth of graduates with competencies that meet the requirements of the labor market; - The introduction of new advanced technologies and services in training; - Well-established network of cooperation with international organizations, universities and schools; -Increase the number of users of social networks in official university accounts/	- High competition in the educational market**;** - Strengthening the information presence of competing universities.

CONCLUSION

- Working Group on Specialized Accreditation of the Doctoral Education Programme 6D072000 –Chemical Technology of Inorganic Substances of M. Auezov South Kazakhstan State University, analyzing the goals of the educational programme and the policy in the field of quality assurance, the state of educational-and-methodical research activities, human resources, material and technical base and information resources, notes the following:

- The department activity is organized in accordance with the stated mission, as well as the strategic development plan of the university and aimed at their implementation. The goals of the educational programme are harmonized with the national qualifications frameworks and the Dublin descriptors.

- The department teaching staff has a high scientific potential, professional training, considerable experience in teaching, scientific and organizational work, possesses modern innovative, informational and educational technologies. The leading scientists who actively participate in research in the field of chemical technology of inorganic substances are involved to the educational process and supervision of doctoral students.

- To improve the educational programme and ensure the quality of education in doctoral studies, a competence approach is used. For the effective implementation of the educational programme, the department cooperates with leading industrial enterprises, which allows for training in accordance with the modern requirements of the labor market, as well as with leading universities from near and far abroad.

- The degree of qualification of doctoral students of the educational programme and their relevance at the labor market is confirmed by results of doctoral thesis defense and positive reviews of reviewers.

- The structure and content of the educational programme correspond to the established requirements for the accounting and measuring instruments of education. Training programs are updated on permanent basis, that satisfy the current state of the labor market. The research work of doctoral students and teachers has an innovative focus and it is devoted to research in the field of chemical technology of inorganic substances, processing of mineral and technogenic raw materials.
- Under this educational programme, all the necessary conditions for conducting fundamental and applied research, research and experimental designing have been created. Laboratories are equipped with the latest equipment and instruments. Students have the opportunity to conduct research at the bases of the ESIC, in the certified laboratory of physicochemical methods of analysis "SAPA", the testing regional engineering laboratory "CBM".
- Thus, the Educational Programme 6D072000 – Chemical technology of inorganic substances meets the criteria of the standards of specialized accreditation of the Independent Agency for Quality Assurance in Education.

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN

M.AUEZOV SOUTH KAZAKHSTAN STATE UNIVERSITY

Institute of Postgraduate education

ANNEXES TO THE REPORT
on the self-assessment of educational programme 6D072000-Chemical technology of inorganic substances for compliance with the criteria of the standards of specialized accreditation of the Independent agency for quality assurance in education (IQAA)

Date of program introduction: 2009
Program location:
Shymkent city, Tauke khan, 5.
Date of report submission: 25.02.2019

Shymkent, 2019

Content

Annex 1. Modular educational program

MINISTRY OF EDUCATION AND SCIENCE OF
THEREPUBLICOFKAZAKHSTAN
M.AUEZOV SOUTH KAZAKHSTAN STATE UNIVERSITY

«APPROVED »
Rectorof M.Auezov SKSU
doct.h.science, professor
_____Kozhamzharova D.P.
«___»_____2019

MODULAR EDUCATIONAL PROGRAM

6D072000-Chemical technology of inorganic substances

the level of education:PhDdoctorate

Shymkent-2018

Modular educational program has been developed in accordance with the State obligatory standard of higher and postgraduate educationSOSENo. 1080 dated 23.08.2012, approved by the Government of the Republic of Kazakhstan with changes and additionsNo. 292from 13.05.2016;sample curriculum of the specialty 6D072000-Chemical technology of inorganic substances, approved by an order of the MES RKNo. 425 from05.07.2017, industry qualifications framework «Chemical production», approved as of16 August,2016, Minutes №1.

Authors:

Full name	position	signature
SeitmagzimovaG.M.	Candidate of technical sciences, head of department«Chemical technology of inorganic substances»	
TleuovaS.T.	Candidate of technical sciences, associate professor of the department«Chemical technology of inorganic substances»	
Dzhanmuldayeva Zh.K	Candidate of technical sciences, professor of the Department«Chemical technology of inorganic substances»	
KoshkarbaevaSh.T.	Candidate of technical sciences, associate professor of the department«Chemical technology of inorganic substances»	
FrangulidiL.Kh.	Directorof NDFZ LLC «Kazphosphate»	
Dormeshkin O.B.	Doctor of Technical Sciences, professor of the Belarusian State Technological University(Minsk city, Republic of Belarus)	

Considered by the Committee on innovative training technologies and methodological support of the Higher school«Chemical Engineering and Biotechnology»
Minutes №_____ from «____» _____201__.

Chairman of the Committee_____ Esmurzayeva R.M.

Considered and recommended for approval at a meeting of the Educational and Methodical Council of M. Auezov SKSU
Minutes №___from_____.

Approved by the decision of the Academic Council of the University
Minutes №_____ from «____» _____201__.

The Modular educational program has been modified in accordance with the newly introduced State Obligatory Standard of Higher and Postgraduate Education, approved byan order No. 604 of the Minister of Education and Science of the Republic of Kazakhstan, dated October 31, 2018.

CONTENT

1. PASSPORT OF THE EDUCATIONAL PROGRAM

1.1Goals and objectives of theeducational program

The goalsof educational program(EP) correspond to the 8th level of the National Qualifications Framework of the Republic of Kazakhstan,they are also harmonized with the Dublin descriptors, 3 cycleof a FrameworkforQualificationsoftheEuropeanHigherEducationArea, and also8 Level (TheEuropeanQualificationsFrameworkforLifelongLearning)

Mission of M. Auezov SKSU - ***Formation of the intellectual elite of the country based on the generation of new knowledgeand transformation of the university into an entrepreneurial university.***

1.1.1 Comparison of program goalswith learning outcomes

The programgoal	Learning outcomes
G1. Preparation of competitive highly qualified specialists with methodological knowledge in the field of innovative research activities, capable of independent thinking, to form and implement ideas of scientific development in the field of chemical technology of inorganic substances	LO1. Organize and plan research in the field of technology of inorganic compounds and electrochemical technology
	LO 2. Analyze scientific information in the field of inorganic technology using modern information technologies and draw conclusions
	LO 3. Conduct an independent scientific study, characterized by academic integrity, based on modern theories and methods of analysis
	LO4. Competently and effectively use modern research methodology and demonstrate the effectiveness of selected scientific methods
	LO 5. Scientifically substantiate the optimal technological conditions for the production of complex and complex-mixed fertilizers, for obtaining composite electrochemical coatings
	LO 6. Independently develop a research project, submit it for a grant competition and manage a domestic or international research project in the field of inorganic substances production and electrochemical technology
	LO 7. Plan, predict and coordinate tests and implementation of developed inorganic substances technologies in existing production facilities.
	LO 8. Analyze and summarize the results of research in the scientific report and publications, test new scientific data at international scientific conferences and in articles in high-ranking international scientific journals
	LO9.To substantiate and protect new scientific data and demonstrate the practical significance of the research results to the audience of specialists; to file applications for the protection of intellectual property rights to scientific discoveries and developments
	LO 10. Generate your own innovative scientific ideas,

	communicate your knowledge and ideas to the scientific community, expanding the boundaries of scientific knowledge
G2.Training of specialists fluent in state and foreign languages, knowledge of leadership in the processes and activities of the team, decision making and responsibility at the level of institutional structures, analysis, evaluation and implementation of innovative ideas in the professional and social sphere	LO 11. Have leadership and team management skills
	LO 12. Demonstrate a responsible and creative attitude to scientific and scientific-pedagogical activity
	LO13. Plan and predict your future professional development
	LO 14. Freely communicate and conduct presentations in a professional environment in a foreign language

1.1.2 Objectivesof the educational program

To achieve the goals of the educational programthe following objectives are set:

- acquisition of skills for analyzing and evaluating modern scientific theories to substantiate the choice of the direction of scientific research;
- development of skills and skills of independent thinking and planning in order to analyze and summarize the results of research and protect their own scientific ideas on the development of new technologies of inorganic compounds;
- inculcation of independent skills of interaction in the scientific community, including at the international level, in order to improve the skills in the field of technology of inorganic substances;
- development of leadership skills and autonomy, pedagogical and scientific ethics of a research scientist.

1.2 Listofqualificationsandpositions

A degree «Doctor of Philosophy PhD»on specialty6D072000-Chemical technology of inorganic substances is awarded to a graduate of the educational program«Chemical technology ofinorganic substances». Doctor PhD in the specialty 6D072000-Chemical technology of inorganic substances can occupy the following positions in research institutions, design and design organizations and educational organizations, industrial enterprises without presenting requirements for work experience in accordance with the industry qualifications framework"Chemical Production", approved on August 16 2016 (protocol No. 1):

- research scientist
- university teacher,
- leading technologist
- production manager,
- technical director
- project manager.

1.3 Qualification characteristics of the graduate of the educational program

The sphere of professional activity are scientific-research institutions of various branches of chemical technology, chemical production of inorganic substances and compounds and higher educational institutions by specialty profile.

Objects of professional activity

The objects of professional activity of graduates are enterprises of the chemical industry, government bodies in the field of the organization of the chemical industry, organizations of higher and special education, higher educational institutions by specialty profile, research institutes, research and production institutions.

Subjects of professional activity

The subjects of the professional activity of the doctor PhD in the specialty 6D072000-Chemical technology of inorganic substances are:

- all types of products of inorganic synthesis;
- mineral and technogenic raw materials for the production of phosphorus, ammonia, mineral fertilizers, acids and salts;
- industrial plants and technological equipment for the production of inorganic substances and compounds, and electrochemical technology;
- analytical instruments of research laboratories;
- research and scientific projects.

Types of professional activity

Doctor of philosophy PhD in the specialty 6D072000 - Chemical technology of inorganic substances can perform the following professional activities:

- research activities in the field of chemical technology of inorganic substances;
- scientific and pedagogical activity in higher education institutions;
- design and organizational activities in design institutes;
- management activities.

Functions of professional activity

Doctor of philosophy PhD in the specialty 6D072000 -Chemical technology of inorganic substances in accordance with the direction of training can perform the following functions at the objects of professional activity:

-scientific and pedagogical activity in higher and secondary specialized educational institutions by specialty profile;
- organization and implementation of scientific research;
- development, implementation and management of research projects in the field of production of inorganic substances and electrochemical technology;
- development of technologies for inorganic substances and their introduction into production;
- analysis of research results and justification of the optimal technological mode of production of complex mineral fertilizers, obtaining composite electrochemical coatings.

Directions of professional activity

Professional areas include the chemical industry of inorganic substances, science and education.

2 COMPETENCES OF AGRADUATE OF THE EDUCATIONAL PROGRAM

Competencies of a graduate of the educational program “Chemical technology of inorganic substances” of the specialty 6D072000 - Chemical technology of inorganic substances, acquired as a result of the development of the educational program contribute to the formation of the following competencies:

- Universal (general, above subject) UK;
- SubjectSK.

2.1 Universal Competences

Universal competencies are characterized by the fact that the graduate has:

UC 1 – Ability to apply logical, analytical and critical thinking to solve scientific and industrial problems;

UC 2 – Ability to apply advanced professional knowledge and skills in practice;

UC 3 – The ability to identify the scientific nature of problems in the professional field;

UC 4 – Ability to solve problems in professional activity on the basis of expanding or rethinking existing knowledge and professional practice;

UC 5 – The ability to assess the need for resources and plan their use in solving problems in professional activities;

UC 6 –Demonstrate a high level of scientific training and the ability of sustained interest in developing new ideas or processes;

UC 7 – Ability to generate ideas, predict the results of innovation;

UC 8 – Explore, develop, implement and adapt projects leading to the acquisition of new knowledge and new solutions;

UC 9 - Responsibility for the result in the scale of the industry, the country, at the international level and the ability to communicate authoritatively in the framework of a critical dialogue with equal specialists in status;

UC 10 – The ability to critically evaluate and rethink accumulated experience, to reflect on professional and social activities;

UC 11 – The ability to carry out industrial or applied activities in an international environment;

UC 12 – Ability to use regulatory and legal documents in their activities;

UC 13 - Striving for self-development and adaptation to new economic, social, political and cultural situations.

UC 14 – Lead complex production and scientific processes.

2.2 Subject competences

Subject competences are characterized by the fact that the graduate has:

SC 1 – The ability to use theoretical and applied knowledge of relevant related disciplines necessary for solving applied problems of various branches of chemical technology of inorganic substances;

SC 2– Skills in analyzing and structuring the problem statement: have the skills to formulate scientific and technical problems, to develop and implement strategic solutions in the field of the production of inorganic compounds;

SC 3 – Skills to independently carry out a set of scientific research methods of processing mineral raw materials, obtaining new inorganic substances and compounds;

SC 4 – The ability to organize work activities on a scientific basis, to carry out scientific management of the creative team in the implementation of research projects;

SC5 –Knowledge of the mechanism of chemical-technological processes, current trends in the integration and differentiation of sciences, the interpenetration of research methods;

SC 6 – The ability to analyze current trends in the development of science, technology and production and the prospects for chemical technology of inorganic compounds;

SC7 – Skills of analysis of chemical-technological systems, raw materials and energy problems of the industry, optimization of technological regimes, use of waste technology of inorganic substances in related industries;

SC8-The ability to carry out scientific and scientific-pedagogical activities in the field of chemical technology of inorganic substances;

SC9-The ability to justify and present the results of research activities at conferences of the republican and international levels in the state and foreign languages.

2.3Interrelation of key competencieswith modules

Type of competence	Formed competencies	Modules, in the study of which competencies are formed
KP1. Competence in the field of native and foreign languages and pedagogical skills	UC1,UC3, UC7, UC8,UC9, UC10, SC1, SC4, SC9	Module of Professional Competence Development
		Module of final certification

KP2. Technical competence	UC 3, UC4, UC 5, UC 7, UC 14, SC 1, SC 2, SC 3, SC 5, SC 7	Scientific substantiation of technology
		New theoretical and technological aspects
		Module of Professional Competence Development
KP3. Learning competence	UC2, UC4, UK5, UK6, UK8, UK10, UK12, SC 2, SC3, SC4, SC5, SC6, SC8	Module of Professional Competence Development
		Module of final certification
KP4. Interpersonal, intercultural and social competencies, as well as civic competence	UC2, UC6, UC9, UC13, SC3, SC 4, SC 6, SC 8, SC 9	Module of Professional Communication Improvement
KP5. Additional abilities (critical thinking, creativity, innovative dimension, active life position)	UC1, UC4, UC6, UC8, UC9, UC10, UC12, SC 7, SC 9	Module of Professional Competence Development
		Module of final certification

2.4Relationship between learning outcomes and competencies

LO	*Learning outcome (graduate must be ready)*	Competences
LO1	Organize and plan research in the field of inorganic technology and electrochemical technology	UC1, UC3, SC1
LO2	Analyze scientific information in the field of inorganic technology using modern information technologies and draw conclusions	UC 2, UC 5, UC 11, SC 2, SC 5, SC 6
LO3	Conduct an independent scientific study, characterized by academic integrity, based on modern theories and methods of analysis	UC2, UC3, UC7, SC1, SC2, SC5, SC6
LO4	Competently and effectively use modern research methodology and demonstrate the effectiveness of selected scientific methods	UC2, UC5, UC6, UC13, SC3, SC5
LO5	Scientifically substantiate the optimal technological conditions for the production of complex and complex-mixed fertilizers, for obtaining composite electrochemical coatings	UC4, UC12, SC1, SC2, SC7
LO6	Independently develop a research project, submit it for a grant competition and manage a domestic or international research project in the field of inorganic substances production and electrochemical technology	UC4, UC8, UC14, SC3, SC6,
LO7	Plan, predict and coordinate the testing and implementation of developed technologies of inorganic substances in existing industries	UC1, UC11, UC14, SC3, SC4, SC5,
LO8	Analyze and summarize the results of research in a scientific report and publications, test new scientific data at international scientific conferences and articles in high-ranking international scientific journals	UC1, UC3, UC8, UC11, UC12, SC2, SC3, SC7, SC9
LO9	To substantiate and protect new scientific data and demonstrate the practical significance of the research results to the audience of specialists; to file applications for the protection of intellectual property rights to scientific discoveries and developments	UC2, UC3, UC6, UC8, SC1, SC3, SC5

LO10	Generate your own innovative scientific ideas, communicate your knowledge and ideas to the scientific community, expanding the boundaries of scientific knowledge	UC7, UC9, UC11, UC13, UC14, SC1, SC2
LO11	Have leadership and team management skills	UC 2, UC 6, UC14,SC4
LO12	Demonstrate a responsible and creative attitude to scientific and scientific-pedagogical activity	UC 6, UC 8, UC 12, UC 13, SC2, SC4, SC6
LO13	Plan and predict your future professional development	УК7, УК10, УК13, SC 2
LO14	Freely communicate and conduct presentations in a professional environment in a foreign language	УК6, УК9, УК11, SC 9

2.5The relationship of learning outcomes and modules

Module name	LO1	LO2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10	LO 11	LO1 2	LO1 3	LO1 4
Scientific substantiation of technology	◑	●	◔	◕	◑			◑	◔					◑
New theoretical and technological aspects	◑			◑	◕	●								◔
Professional competency development module	◕	◕	●	◕	◔	◑	●	◕	●	◑	◑	◑	◑	◕
Module final certification	◔	◑	●	◑	◑		◕	◑	●	●	◔	◕	◑	◕

Designations:

1. is the essence of the module ●;
2. is the core issue of the module ◕;
3. deepens ◑;
4. affected ◔

3. Providing professional practices: their types, main typical places of organization and conduct, evaluation of results

Pedagogical practice

The purpose pedagogical practice of postgraduate education is the preparation of a future teacher for scientific and pedagogical activity in a higher educational institution, the development of his pedagogical culture, the acquisition and consolidation of practical skills in the implementation of the educational process in higher education, including the teaching of special disciplines, the organization of educational activities of undergraduate students and graduate, scientific and methodical work on the subject. The bases of practice are universities and departments on the profile of the educational program.

Acquired skills and competencies

–Ability to apply logical, analytical and critical thinking to solve scientific and industrial problems;

- Ability to apply advanced professional knowledge and skills in practice;

- Demonstrate a high level of scientific training and the ability of sustained interest in developing new ideas or processes;

- The ability to organize work activities on a scientific basis, to carry out scientific management of the creative team in the implementation of research projects;

- The ability to carry out scientific and scientific-pedagogical activities in the field of chemical technology of inorganic substances;

- Ability to develop educational and methodological documentation for the educational process in a special discipline;

- Possession of modern educational technologies, ways of enhancing learning activities, the basic principles of the educational process on the credit technology of teaching in higher education with the specifics of interaction in the "student-teacher" system.

Research practice

The purpose of the research practice of doctoral students is the study of the latest theoretical, methodological and technological achievements of domestic and foreign science, the consolidation of practical skills, the use of modern methods of collecting, processing and interpreting experimental data in the dissertation research.

Base research practice. Research practice is organized by the Department of Chemical Technology of Inorganic Substances under the relevant agreements with leading enterprises and research and design institutes, leading universities in the specialty profile, accredited research centers and laboratories.

Acquired skills and competencies:

- The ability to identify the scientific nature of the problems in the professional field;

- Possession of the skills of analyzing and structuring the problem statement: have skills in formulating scientific and technical problems, in developing and implementing strategic solutions in the field of the production of inorganic compounds;

- The ability to analyze current trends in the development of science, technology and production and the prospects for chemical technology of inorganic compounds;

- The ability to carry out scientific and scientific-pedagogical activities in the field of chemical technology of inorganic substances;

- Ability to substantiate and present the results of research activities at conferences of the republican and international levels in the state and foreign languages;

- Possession of modern methods of organizing and conducting research;

- Possession of modern methods of analysis and interpretation of research results.

Functions of research practice managers from the university and the enterprise:

- provide qualified scientific guidance;

- constantly monitor the progress of research work of the doctoral candidate, check and approve the entries in the practice diary; in the current reports of the doctoral candidate to the head to give an objective assessment of the work done;

- to facilitate in every way the collection of doctoral scientific information in the internship at the enterprise.

An enterprise or organization in every possible way assists a doctoral candidate in gathering information, selecting materials, computer software for his work, drawing up a report and sections of a doctoral dissertation. The doctoral student should be provided with archives, libraries, laboratories of chemical plants.

4. CONTENTS OF EDUCATIONAL PROGRAM

Module name	Formed competencies	CreditsECTS	Study period	Module components	Cycle of discipline	Component	form of control
1. Specialty modules							
Scientific substantiation of technology	**knowledge and understanding:** demonstrate knowledge of the mechanism of chemical-technological processes, current trends in the integration and differentiation of sciences, the interpenetration of research methods; **application of knowledge and understanding:** apply the methods of logical and critical thinking to solve scientific and industrial problems; analyze current trends in the development of science, technology and production and the prospects for chemical technology of inorganic compounds; **communication skills:** organize work activities on a scientific basis.	5	1 semester	Innovative technology of inorganic substances	BD	CC	exam
		5	1 semester	Research methodology	PD	EC	exam
			1 semester	Optimization of chemical-and-technological processes	PD	EC	exam
New theoretical and technological aspects	**knowledge and understanding:** demonstrate a high level of scientific training and the ability of sustained interest in developing new ideas or processes; **application of knowledge and understanding:** use the theoretical and applied knowledge of relevant related disciplines necessary for solving applied problems of various branches of chemical technology of inorganic substances; apply methods of analysis and structuring of the technical formulation of the problem; **formation of judgments:** identify the scientific nature of the problems in the professional field; determine the needs of society in the production of chemical technology of inorganic substances; **communication skills:** to carry out scientific leadership of the creative team in the implementation of research projects; to lead complex industrial and scientific processes **learning skills or learning ability:** Skills of analysis of chemical-technological systems, raw materials and energy problems of the industry, optimization of technological regimes, use of waste technology of inorganic substances in related industries; explore, develop, implement and adapt projects leading to new knowledge and new solutions.	5	1 semester	Management of scientific projects of inorganic compounds' productions	PD	EC	exam
			1 semester	Management of scientific projects of electrochemical productions	PD	EC	exam
		6	1 semester	Modern technology complex-mixed fertilizers	PD	EC	exam
			1 semester	The latest advances in applied electrochemistry	PD	EC	exam
		6	1 semester	Technology of nitric acid processing of phosphate raw materials	PD	EC	exam
			1 semester	New methods for producing composite coatings	PD	EC	exam
2. Additional modules beyond qualifications							
Professional Competency Development Module	**knowledge and understanding:** demonstrate knowledge of the mechanism of chemical-technological processes, current trends in the integration and differentiation of sciences, the interpenetration of research methods; **application of knowledge and understanding:** independently carry out a complex of scientific research on methods for processing mineral raw materials, obtaining new inorganic substances and	3	1 semester	Pedagogical practice			Differential check
		6	2 semester	Pedagogical practice			Differential check
		17	3 semester	Research practice			Differential check
		115	2-6 semester	Doctoral research			Report

	compounds; be able to solve problems in professional activities based on the expansion or rethinking of existing knowledge and professional practice; **formation of judgments:** be able to assess the need for resources and plan their use in solving problems in professional activities **communication skills:** substantiate and present the results of research activities at conferences of the republican and international levels in the state and foreign languages; **learning skills or learning ability:** independently carry out scientific and pedagogical activities in the field of chemical technology of inorganic substances.						
Module final certification	**knowledge and understanding:** possess knowledge of theoretical and applied knowledge of relevant related disciplines necessary for solving applied problems of various branches of chemical technology of inorganic substances; demonstrate a high level of scientific training and the ability of sustained interest in developing new ideas or processes; **application of knowledge and understanding:** apply logical, analytical and conceptual thinking to solve scientific and industrial problems; to critically evaluate and rethink the accumulated experience, to reflect on professional and social activities; **formation of judgments:** analyze current trends in the development of science, technology and production and the prospects for chemical technology of inorganic compounds; determine the needs of society for the products of chemical technology of inorganic substances; **communication skills:** Responsibility for the result on the scale of the industry, the country, at the international level and the ability to communicate authoritatively in the framework of a critical dialogue with equal specialists in status; substantiate and present the results of research activities at conferences of the republican and international levels in the state and foreign languages.	12	6 semester	Doctoral thesis and defense			Protection

5.SUMMARY TABLE REFLECTING THE VOLUME OF COMPLETED CREDITS UNDER THE EDUCATIONAL PROGRAM MODULES

Course of Study	Semester	The number of completed modules	The number of studied disciplines		Number of credits ECTS						Total hours	Number	
			CC	EC	Theoretical training	Pedagogical practice	Research practice	SRWD	Doctoral dissertation and defense	Total		exam	Graduated pass
1	1	5	1	4	27	3				30	900	5	1
	2					6		24		30	900		1
2	3						17	13		30	900		1
	4							30		30	900		
3	5							30		30	900		
	6							18	12	30	900		
total			1	4	27	9	17	115	12	180	5400	5	3

6.FORM FOR MODULE DESCRIPTION

Moduletitle	Scientific substantiation of technology Components: 1) Innovative technologies of inorganic substances 2) Research methodology 3) Optimization of chemical-technological substances	
Department responsible for the module	Department “Chemical technology of inorganic substances”	
Type of module	Specialty module	
Level of module	PhD doctoral studies	
Number of credits	For the entire module: 10 ECTS	1) Innovative technologies of inorganic substances:5 ECTS (Lectures -2, practical classes - 3); 2) Research methodology: 5 ECTS (Lectures -2, practical classes - 3); 3) Optimization of chemical-technological substances: 5 ECTS (Lectures - 2, practicalclasses - 3);
Semesters	1 semester	
Module prerequisites	Chemistry and technology of inorganic substances, Bases of modern technology of processing mineral raw materials	
Module postrequisites	Researchpractice, Doctoralresearch, Doctoral thesis and defense	
Module contents	1) **Innovative technologies of inorganic substances**. The modern level of development of technology of inorganic substances in Kazakhstan. Production of mineral fertilizers with improved properties based on new types of raw materials. The main directions of improvement of technology of liquid complex fertilizers and suspended complex fertilizers. Improving the technology and equipment for wet-process phosphoric acid production. Complex technologies for processing solid waste of phosphorus production. New ways to process phosphoric slag, cottrel dust and sludge. Processing of non-conditional raw materials. Reducing the coke dependence of phosporus production. Analysis and evaluation of various theoretical concepts in the field of research of innovative technologies for processing non-standard raw materials.	
	2)**Research Methodology**.Principlesofscientificcognition. Methods of scientific research. Empiricalandtheoreticalcognition. Means of scientific research: linguistic, logical, informational, material-and-technical, mathematical.The conceptual phase of research design: design of the research, revealing the scientific contradiction. Incompleteness of the subject area investigation, revealing the mismatch of theories of the relevant subject area. Principles of analytical literary research of a subject area, application of information technologies for studying a scientific direction. Principles of scientific electronic library operation. The use of various databases for scientific data collection and their analysis, compiling a list of bibliographies on the theme of scientific research. Analysis and systematization of literature data.Formulation of the research problem based on the revealed contradiction. Assessment of the problem and justification of the research urgency.Construction of research hypotheses, creation of a program (methodology) of research. Planning of individual and collective scientific research.Technological phase of research design. Experimental work. Criteria of scientific research effectiveness: scientific novelty, practical significance, theoretical significance. The stage of research results’ formatting, approbation of its results, their literary design and publication. Scientificstyleofwork. Cultureofscientificcitation. Principles of scientific research ethics in the preparation of scientific report, abstract, paper, thesis. Specificity of scientific paper preparation to peer-reviewed journals. Reflexive phase of scientific	

	research. Presentation of scientific research results. Features of preparation of the speech with a scientific report.
	3) **Optimization of chemical-technological processes**. Chemical-technological processes and systems, their characteristic technical and economic indicators. Tasks of system analysis and optimization of chemical-technological processes and chemical-technological systems. Principles of process management and systems. Systems of regulation and control of technological processes. Methods of optimization of processes and systems of chemical technology.Mathematical programming. Calculation of material and energy balances, technical and economic indicators of the processes and systems of chemical technology. Multi-level optimization of processes and systems of chemical technology. Simulation of chemical and technological processes. The value of modeling research and design of chemical-technological processes. The method of generalized variables (basic similarity theory). Transformations of differential equations by similarity methods.
Learning outcomes	After studying the module, the student should be able to: - analyze, evaluate and compare various theoretical concepts in the field of research and draw conclusions; - conduct an independent scientific study, characterized by academic integrity, on the basis of modern theories and methods of analysis; - generate their own new scientific ideas, communicate their knowledge and ideas to the scientific community, expanding the boundaries of scientific knowledge; - apply the skills of scientific referencing and quoting when publishing articles, theses and reports on research; - work effectively with modern printed and electronic sources of scientific information; - analyze and apply the results of scientific research in practical professional activities; - scientifically substantiate the optimal technological regimes of inorganic production; - plan and forecast their further professional development.
Finalcontrol	Exam
Module duration	1 semester
Update date	30.06.2018

Module components

Moduletitle	Innovative technologies of inorganic substances
Department responsible for the module	Department “Chemical technology of inorganic substances”
Type of module	Specialty module
Level of module	PhD doctoral studies
Number of hours/week	3
Number of credits	5 ECTS (Lectures -2, practical classes - 3)
Form of training	Fulltime
Semester	1 semester
Number of students	12
Module prerequisites	Chemistry and technology of inorganic substances, Bases of modern technology of processing mineral raw materials
Module post requisites	Researchpractice, Doctoralresearch, Doctoral thesis and defense

Module contents	**Lecture classes:** The modern level of development of technology of inorganic substances in Kazakhstan. Production of mineral fertilizers with improved properties based on new types of raw materials. The main directions of improvement of technology of liquid complex fertilizers and suspended complex fertilizers. Improving the technology and equipment for wet-process phosphoric acid production. Obtaining pure phosphoric acid and derivatives based on it. Complex technologies for processing solid waste of phosphorus production. New ways to process phosphoric slag, cottrel dust and sludge. Processing of non-conditional raw materials. Reducing the coke dependence of phosporus production. Analysis and evaluation of various theoretical concepts in the field of research of innovative technologiesfor processing non-standard raw materials. Evaluation of scientific research based on modern methods of analysis. **Practical classes**: Methods for calculating the change in heat capacity for complex systems using the modern complex program "Astra". Calculation of the thermal effect of physico-chemical transformations by the method of Landia and Lantimore. Calculation of changes in the entropy of isobaric processes and Gibbs free energy using a PC using the OutkumpuHSCChemistry program 5.1. Graphic calculation of the equilibrium constant of physicochemical transformations. The use of equations for the kinetic studies of chemical reactions. Graphic dependences of the degree of conversion on temperature and duration and the calculation of the apparent activation energy.
Learning outcomes	After studying the module, the student should be able to: - analyze, evaluate and compare various theoretical concepts in the field of research and draw conclusions; - conduct an independent scientific study, characterized by academic integrity, based on modern theories and methods of analysis; - generate their own new scientific ideas, communicate their knowledge and ideas to the scientific community, expanding the boundaries of scientific knowledge; - choose and effectively use modern research methodology; - plan and predict your further professional development.
Finalcontrol	Exam
Current control forms	Mid-term control in the form of DSSDS, practical calculations
Module duration	1 semester
Recommended textbooks	1. С. Тлеуова, А.Тлеуов. Комплексная переработка металлургических и нефтехимических отходов. Монография. – Шымкент: ЮКГУ им.М.Ауэзова, 2014. – 321 с. 2. Жантасов К.Т., Искандиров М.З., Айбалаева К.Д., Алтеев Т.А., Новик Д.М., Жантасова Д.М. Современные технологии переработки минерального сырья. Учебник. – Шымкент: ЮКГУ им. М.Ауезова, 2015г. 3. Тлеуова С.Т., Жулдызбаева С.Е., Тлеуов А.С., Сихымбаева Ж. Безотходная технология. Учебноепособие. – Алматы: Нурайпринтсервис, 2015. – 195 с. 4. CavaniF. etal. Sustainable Industrial Chemistry. Principles, Tools and Industrial Examples.- Wiley. 2009.- 623 p. 5. Жантасов К., Искандиров М.З., Сахи М.С., Алтеев Т.А.Өнеркәсіптік химиялық және механикалық процестер/Оқулық. –Шымкент: М.әуезов атындагы ОқМУ, 2016. 6. С.Тлеуова, А.Тлеуов, Ж.Алтыбаев, У.Назарбек. Ресурсосберегающие технологии переработки техногенных отходов. Учебное пособие. – Шымкент: ЮКГУ им.М.Ауэзова, 2016. – 262 с.
Update date	30.06.2018

Moduletitle	Research methodology
Department responsible for the module	Department “Chemical technology of inorganic substances”
Type of module	Specialty module
Level of module	PhD doctoral studies
Number of hours/week	3
Number of credits	5 ECTS (Lectures -2, practical classes - 3)
Form of training	Fulltime
Semester	1 semester
Number of students	12
Module prerequisites	Chemistry and technology of inorganic substances, Bases of modern technology of processing mineral raw materials
Module post requisites	Researchpractice, Doctoralresearch, Doctoral thesis and defense
Module contents	**Lecture classes:** Principlesofscientificcognition. Methods of scientific research. Empiricalandtheoreticalcognition. Means of scientific research: linguistic, logical, informational, material-and-technical, mathematical.The conceptual phase of research design: design of the research, revealing the scientific contradiction. Incompleteness of the subject area investigation, revealing the mismatch of theories of the relevant subject area. Principles of analytical literary research of a subject area, application of information technologies for studying a scientific direction. Principles of scientific electronic library operation. The use of various databases for scientific data collection and their analysis, compiling a list of bibliographies on the theme of scientific research. Analysis and systematization of literature data.Formulation of the research problem based on the revealed contradiction. Assessment of the problem and justification of the research urgency.Construction of research hypotheses, creation of a program (methodology) of research. Planning of individual and collective scientific research. Technological phase of research design. Experimental work. Criteria of scientific research effectiveness: scientific novelty, practical significance, theoretical significance. The stage of research results’ formatting, approbation of its results, their literary design and publication. Scientificstyleofwork. Cultureofscientificcitation. Principles of scientific research ethics in the preparation of scientific report, abstract, paper, thesis. Specificity of scientific paper preparation to peer-reviewed journals. Reflexive phase of scientific research. Presentation of scientific research results. Features of preparation of the speech with a scientific report. **Practical classes**:Logicandstagesofresearchwork. Basic methods of searching and analyzing scientific information.Methods of working with catalogs, Internet resources and electronic databases.Scientific workshop on the scientific literature search in the library. Work with the state rubricator (subject heading list) of scientific-and-technical information.Analysis of scientific-and-researchinformationon the research theme. Group project for choosing the most effective production method. Working procedure on the research manuscript, the features of preparation and design. Execution of reference bibliographical aids. Analysis of paper structure and content on the direction "Chemical technology of inorganic substances".Procedure of preparation of reports and presentations.Discussion and testing of scientific results. Application writing for patenting of intellectual property.Preparation and defense of a written review on modern research areas in the field of chemical technology of inorganic substances.Rules and standards for the execution of research work reports, theses of papers, articles, synopses of a thesis.
Learning outcomes	After studying the module, the student should be able to: - applythemethodologyofscientific research in education; - possess modernmethodsofscientificresearch;

	- apply the skills of scientific abstracting and quoting when publishing papers, abstracts and reports on scientific research; - effectively work with modern printed and electronic sources of scientific information; - put to an evaluation test ofscientificresearchresults; - conduct an independent scientific research in accordance with main phases of the research work; - analyze and apply scientific research results in practical professional activities.
Finalcontrol	Exam
Current control forms	Mid-termcontrolintheformofDSSDS, reportonthe research, bibliography
Module duration	1 semester
Recommended textbooks	1. Новиков А.М.. Методология научного исследования: учеб.- метод. пособие/А. М. Новиков, Д. А. Новиков.- М.:ЛИБРОКОМ, 2010.-280 с. 2. Лапина, О.А. Методологические основы научного исследования: учеб.-метод. пособие.– Иркутск:Изд-во ИГУ, 2016. –123 с. 3. Поликарпов В.С., Поликарпова Е.В., Поликарпова В.А. Методология научных исследований. // Научно-образовательный центр «Методологические проблемы научных исследований». -Ростов-на-Дону, 2014.- 96 с. 4. Рыжков И.Б. Основы научных исследований и изобретательства: учебное пособие для вузов /И.Б. Рыжков. – Санкт-Петербург.: Лань, 2012. – 222 с. 5. Лебедев, С.А. Методология научного познания [Электронный ресурс] : учебное пособие / Лебедев С.А. - М. : Издательство Юрайт, 2016. - 153 с. 6. C.R. Kothari. ResearchMethodology. Methods & Techniques. – New Age International (P) Limited, Publishes, 2004. – 414p. 7. Ranjit Kumar. Research Methodology: A step-by-step guide for beginners. – Sage: Los Angeles/ London/ New Delhi/ Singapore/ Washington DC, 2011. – 366p.
Update date	30.06.2018

Moduletitle	Optimization of chemical-technological substances
Department responsible for the module	Department “Chemical technology of inorganic substances”
Type of module	Specialty module
Level of module	PhD doctoral studies
Number of hours/week	3
Number of credits	5 ECTS (Lectures -2, practical classes - 3)
Form of training	Fulltime
Semester	1 semester
Number of students	12
Module prerequisites	Chemistry and technology of inorganic substances, Bases of modern technology of processing mineral raw materials
Module post requisites	Researchpractice, Doctoralresearch, Doctoral thesis and defense
Module contents	**Lecture classes**: Chemical-technological processes and systems, their characteristic technical and economic indicators. Tasks of system analysis and optimization of chemical-technological processes and chemical-technological systems. Principles of process management and systems. Systems of regulation and control of technological processes. Methods of optimization of processes and systems of chemical technology. Analytical methods. Mathematical programming. Gradient methods. Principle maximum. Calculation of material and energy balances, technical and

	economic indicators of the processes and systems of chemical technology. Analysis and synthesis of calculated information. Multi-level optimization of processes and systems of chemical technology. Simulation of chemical and technological processes. The value of modeling research and design of chemical-technological processes. Physical and mathematical modeling. Analytical and statistical methods for processing experimental data. Features of the use of computer mathematical systems in solving standard problems in the technology of inorganic substances. The method of generalized variables (basic similarity theory). Criteria (numbers) of similarity. Transformations of differential equations by similarity methods. Generalized criterial equations. Dimensionanalysis. **Practical classes**: Analysis and synthesis of complex technological processes. Calculation of material and energy balances, technical and economic indicators of the processes and systems of chemical technology. Analysis and synthesis of calculation results. Multi-level optimization of processes and systems of chemical technology.
Learning outcomes	After studying the module, the student should be able to: - to analyze and synthesize the studied chemical-technological systems, to operate with the principles of the systems approach in solving problems of mathematical modeling of technological processes; - scientifically substantiate the optimal technological regimes of inorganic production; - apply the principles of regulation and management of technological processes, various methods of modeling research to optimize the processes and systems of chemical technology. - to conduct an independent scientific study, characterized by academic integrity, based on modern theories and methods of analysis; - generate their own new scientific ideas, communicate their knowledge and ideas to the scientific community, expanding the boundaries of scientific knowledge; - plan and forecast their further professional development.
Finalcontrol	Exam
Current control forms	Mid-term control in the form of DSSDS, practical calculations, compilation of a mathematical model of the process under study
Module duration	1 semester
Recommended textbooks	1. Бочкарев В.В. Оптимизация химико-технологических процессов: Учебное пособие. – Томск: Изд.ТПУ, 2014.-264с. 2. Джанмулдаева Ж.К. Химиялық технологияның теориялық негіздері. Оқу құралы. - Алматы: Эверо, 2015. - 188 б. 3. Щитов, И.Н. Введение в методы оптимизации. / И.Н. Щитов. - М.: Высшая школа, 2008. - 206 с. 4. Seitmagzimova G.M. General chemical technology. Textbook.– Ministry of Education and Science of RK: Association of HEU, 2017. – 270p. 5. Сидняев Н. И. Теория планирования эксперимента и анализ статистических данных: учеб. пособие. - Москва: Юрайт, 2011. - 399 с.
Update date	30.06.2018

Moduletitle	**New theoretical and technological aspects** Components: 1) Management of scientific projects of inorganic compounds' productions 2) Management of scientific projects of electrochemical production 3) Modern technologies of complex-mixed fertilizers 4) The latest advances in applied electrochemistry 5) Technology of nitric acid processing of phosphate raw materials 6) New methods for producing composite coatings	
Department responsible for the module	Department "Chemical technology of inorganic substances"	
Type of module	Moduleof "Chemicaltechnologyofinorganic substances" trajectory	
Level of module	PhD doctorate	
Number of credits	For the entire module: 17 ECTS	1) Management of scientific projects of inorganic compounds' productions: 5 ECTS (Lectures -3, practical classes - 2); 1) Management of scientific projects of electrochemical production: 5 ECTS (Lectures -3, practical classes - 2); 2) Modern technologies of complex-mixed fertilizers: 6 ECTS (Lectures -3, practical classes - 3); 2) The latest advances in applied electrochemistry: 6 ECTS (Lectures -3, practical classes - 3); 3) Technology of nitric acid processing of phosphate raw materials: 6 ECTS (Lectures -3, practical classes - 3); 3) New methods for producing composite coatings: 6 ECTS (Lectures -3, practical classes - 3).
Semesters	1 семестр	
Module prerequisites	Chemistry and technology of inorganic substances, Bases of modern technology of processing mineral raw materials	
Module postrequisites	Researchpractice, Doctoralresearch, Doctoral thesis and defense	
Module contents	1) **Management of scientific projects of inorganic compounds' productions**. The basic principles of the preparation of research projects at a national or international competition of research in the direction of the production of inorganic compounds. Scientific programs as a form of policy in the field of education and science of Kazakhstan. Determination of the field of scientific research. Preparation of tender documentation for grant funding of research. Justification of the relevance of the research project. Personnel and communications project management. Estimated financial calculations of the cost of work. Scheduling and organization of the project monitoring system. Gantt chart development.Project risk management. Material and technical preparation of the project. Expected results, areas of application of the results of scientific and technical activities. Examination of scientific projects. Quality management, project cost management, subject area management, time management, contract management and procurement. Control and regulation of the project, evaluation of the effectiveness of research work.	
	2) **Management of scientific projects of electrochemical productions**. The basic principles of the preparation of research projects at a national or international competition of research in the field of electrochemical technology. Scientific programs as a form of policy in the field of education and science of Kazakhstan. The definition of the field of science. Preparation of tender documentation for grant funding of research. Justification of the relevance of the research project. Personnel and communications project management. Estimated financial calculations of the cost of work. Scheduling and organization of the project monitoring system. Gantt chart development. Project risk management. Material and technical preparation of the project.	

	Expected results, areas of application of the results of scientific and technical activities. Examination of scientific projects. Quality management, project cost management, subject area management, time management, contract management and procurement. Control and regulation of the project, evaluation of the effectiveness of research work.
	3)**Modern technologies of complex-mixed fertilizers**. Trends in the development of the production of complex-mixed mineral fertilizers. Dry mixing. Production of fertilizer mixtures based on the principle of compatibility of fertilizer components. Calculation of the composition of fertilizer mixtures to obtain mixed fertilizers according to the diagram of a three-component system. Complex-mixed fertilizers based on phosphoric acid and nitric acid decomposition of natural phosphates. Selection of optimal technological regimes for obtaining nitroammophos and nitroammofoski, nitrophos and nitrophoska, carboammfoski. Liquid and suspended compound fertilizers. Modern technologies for producing mixed fertilizers with the use of chemical production wastes containing trace elements, low-grade phosphate raw materials and additives that improve the quality of mineral fertilizers.
	4)**The latest advances in applied electrochemistry**: Advances in applied electrochemistry. The influence of the composition of the solutions, temperature and impurities on the quality and structure of the cathode metal sediment. New methods of cleaning and regeneration of solutions. Current output in the solution circulation system. The formation of sludge and its processing. Modern galvanic cells and batteries. Theory of work and electrode processes during charging and discharging. Prospects and value of fuel cells. Modern methods of applying protective and decorative coatings. Technological parameters of galvanic galvanizing processes, cadmium plating and copper plating. Coating of noble metals (silver, gilding). Hydrometallurgy of zinc and cadmium. Innovative methods of recycling waste electrochemical processes. The advantages of chemical coatings, the application of metallic coatings on dielectric materials.
	5)**Technology of nitric acid processing of phosphate raw materials**.Theoretical basis of nitric acid processing of natural phosphates. The effect of decomposition temperature, concentration and norms of nitric acid on the degree of extraction of P2O5 from phosphates. The kinetics of the decomposition of phosphates by nitric acid. The influence of the degree of grinding of phosphate and mixing of reagents on the degree of extraction of P2O5. Isolation of nitric acid solution of fluoride compounds, phosphates of rare-earth elements. Ways to remove excess calcium from nitric acid extracts. Nitrogen-carbonate method of processing nitric acid extract. Technological schemes for the production of nitrophosphate nitric-sulfuric acid and nitrogen-sulfate methods, their distinctive features. Advantages of the nitrogen-phosphoric acid method of decomposition of phosphate raw materials. Features of the production of azophoska according to the method with the polythermal crystallization of calcium nitrate. Methods of processing nitric acid extracts into mineral fertilizers, the mechanism and chemistry of ammonization of extracts. Advantages and disadvantages of nitric acid processing of low-grade Karatau phosphorites.
	6)**New methods for producing compositecoatings**.Modern methods of preparing the surface of metal products before applying composite coatings. Classes and types of modern composite materials. Basic information of composite electrochemical and chemical coatings. Physico-chemical basis of the production of new composite coatings. The mechanism of electrocrystallization and the current state of composite coatings. Effect of electrolyte composition on the structure of new composite coatings. Factors affecting the production of composite coatings. Composite and multilayer coatings. The main types of composite coatings. Composite coatings based on

	nickel, copper and chromium.
Learning outcomes	After studying the module, the student should be able to: - independently develop a research project in the field of production of inorganic substances and electrochemical technology and submit it to a domestic or international competition for grant financing; - organize, plan and monitor the implementation of a scientific project in the field of technology of inorganic compounds; - creatively solve the problematic issues of the production of difficult-mixed mineral fertilizers; - to improve the existing production for the processing of mineral and technogenic raw materials into complex-mixed fertilizers; - apply knowledge of the basic laws of nitric acid processing of natural phosphates to select the technological parameters of the production of complex mineral fertilizers; - offer effective ways of processing nitric acid extracts, taking into account the composition of phosphate raw materials; - apply knowledge of laws and technologies of electroplating processes in future professional activities; - compare the laws and regime parameters of electrochemical and chemical processes; - choose a rational technological scheme of electrochemical production.
Finalcontrol	Exam
Module duration	1 semester
Update date	30.06.2018

Module components

Moduletitle	Management of scientific projects of inorganic compounds' productions
Department responsible for the module	Department "Chemical technology of inorganic substances"
Type of module	Moduleof "Chemicaltechnologyofinorganic substances" trajectory
Level of module	PhD doctorate
Number of hours/week	3
Number of credits	5 ECTS (Лекции – 2 KZ, практические – 1 KZ);
Form of training	Fulltime
Semester	1 semester
Number of students	12
Module prerequisites	Chemistry and technology of inorganic substances, Bases of modern technology of processing mineral raw materials
Module post requisites	Researchpractice, Doctoralresearch, Doctoral thesis and defense
Module contents	**Lectures**: Basic principles for the preparation of research projects at a national or international competition of scientific research. Scientific programs as a form of policy in the field of education and science of Kazakhstan. Scientific funds, their characteristics. Foreign and domestic funds supporting research projects. Rules for submitting applications for the competition NIR. Determining the field of scientific research in the production of inorganic compounds. Type of research, the choice of the priority of the development of science, which is applied for participation in the competition of scientific projects.The name of the specialized scientific direction. Individual and collective projects. Preparation of tender documentation for grant funding of research. Justification of the relevance of the research project. Human resource management and project communications: research team and research environment. Estimated financial calculations of the cost of work. Scheduling

	and organization of the project monitoring system. Gantt chart development. Project risk management. Material and technical preparation of the project. Expected results, areas of application of the results of scientific and technical activities. Examination of scientific projects. Information technology project management. Quality management, project cost management, subject area management, time management, contract and supply management. Corporate project management system. Control and regulation of the project, evaluation of the effectiveness of research work. The procedure for the preparation and registration of interim and final reports on the project topic in the NCSTE. Registration of the results of scientific and technical activities. **Practical classes:** Preparation of tender documentation for grant financing. The purpose and objectives of the project. Creation and development of the project team. Development of the project concept. Research methods and ethical issues. Drawing up a schedule of research. The calculation of the costs of the project. The calculation of the payroll of performers, the staffing, the calculation of the consumption of materials, electricity, travel expenses and others. Procurement Project Management. Planning, formulation of tasks for the performers, monitoring of the project, analysis of the results of research. Project life cycles. Risk planning. Monitoring the progress of the project implementation method mastered. Essay "The balance of interests of stakeholders at the completion of the project."
Learning outcomes	After studying the module, the student should be able to: - independently develop a research project in the field of production of inorganic substances and submit it to a domestic or international competition for grant financing; - organize, plan and monitor research in the field of technology of inorganic compounds; - summarize and analyze the results of research in the report on a research project carried out within the framework of grant financing; - generate your own new scientific ideas, communicate your ideas and research results to the scientific community in scientific publications in rating journals and in speeches at international scientific conferences, symposia, congresses; - test new and improved technologies of inorganic substances on an industrial scale.
Finalcontrol	Exam
Current control forms	Mid-termcontrolintheformofDSSDS, oral test on the design theme, development of an application for research project grant financing on the doctoral thesis topic.
Module duration	1 semester
Recommended textbooks	1. Романова, М. В. Управление проектами: учебное пособие - М. :ИД "ФОРУМ": ИНФРА-М, 2014. - 256 с. 2. Заренков, В. А. Управление проектами: учеб. пособие / В. А. Заренков. – 2-е изд. – М. : Изд-во АСВ, 2006. 3. Project Management Resource Center [Electronic resource]. – Mode of access: http://www.allpm.com, free. 4. Абдыгаппарова С.Б., Адилова А.М. Управление государственными проектами и программами //Вестник КазНУ. – 2015. - №4 (110) – С. 52-57.. 5. International Project Management Association [Electronic resource]. – Mode of access: http://www.ipma.ch, free. 6. Международный стандарт по управлению проектами ISO 21500:2012 – GuidanceonprojectmanagementISO, 2012. - 36с. 7. Конкурсная документация по государственным закупкам услуг способом конкурса по отбору научных проектов по предоставлению грантов для выполнения инициативных и рисковых научных

	исследований и разработок - http:// www.scedu.kz 8. ГОСТ 7.32-2001. Отчет о научно-исследовательской работе: структура и правила оформления. – Минск, 2006.
Update date	30.06.2018

Moduletitle	Management of scientific projects of electrochemical productions
Department responsible for the module	Department “Chemical technology of inorganic substances”
Type of module	Moduleof “Chemicaltechnologyofinorganic substances” trajectory
Level of module	PhD doctorate
Number of hours/week	3
Number of credits	5 ECTS (Lectures - 3, practical classes - 2)
Form of training	Fulltime
Semester	1 semester
Number of students	12
Module prerequisites	Chemistry and technology of inorganic substances, Bases of modern technology of processing mineral raw materials
Module post requisites	Researchpractice, Doctoralresearch, Doctoral thesis and defense
Module contents	**Lectures**: Basic principles for the preparation of research projects at a national or international competition of scientific research. Scientific programs as a form of policy in the field of education and science of Kazakhstan. Scientific funds, their characteristics. Foreign and domestic funds supporting research projects. Rules for submitting applications for the competition NIR. Determination of the field of scientific research in the field of electrochemical production. Type of research, the choice of the priority of the development of science, which is applied for participation in the competition of scientific projects. The name of the specialized scientific direction. Individual and collective projects. Preparation of tender documentation for grant funding of research. Justification of the relevance of the research project. Human resource management and project communications: research team and research environment. Estimated financial calculations of the cost of work. Scheduling and organization of the project monitoring system. Gantt chart development. Project risk management. Material and technical preparation of the project. Expected results, areas of application of the results of scientific and technical activities. Examination of scientific projects.Information technology project management. Quality management, project cost management, subject area management, time management, contract and supply management. Corporate project management system. Control and regulation of the project, evaluation of the effectiveness of research work. The procedure for the preparation and registration of interim and final reports on the project topic in the NCSTE. Registration of the results of scientific and technical activities. **Practical classes**: Preparation of tender documentation for grant financing. The goal and objectives of the project. Creation and development of the project team. Development of the project concept. Research methods and ethical issues. Drawing up a schedule of research. The calculation of the costs of the project. The calculation of the payroll of performers, the staffing, the calculation of the consumption of materials, electricity, travel expenses and others. Project management in the field of procurement. Planning, formulation of tasks for the performers, monitoring of the project, analysis of the results of research. Project life cycles. Risk planning. Monitoring the progress of the project implementation method mastered. Essay "The balance of interests of stakeholders at the completion of the project."

Learning outcomes	After studying the module, the student should be able to: - independently develop a research project in the field of electrochemical production and submit it to a domestic or international competition for grant financing; - organize, plan and monitor research in the field of electrochemical technology; - summarize and analyze the results of research in the report on a research project carried out within the framework of grant financing; - generate your own new scientific ideas, communicate your ideas and research results to the scientific community in scientific publications in rating journals and in speeches at international scientific conferences, symposia, congresses; - to test new and improved technologies of inorganic substances on an industrial scale.
Finalcontrol	Exam
Current control forms	Mid-termcontrolintheformofDSSDS, oral test on the design theme, development of an application for research project grant financing on the doctoral thesis topic.
Module duration	1 semester
Recommended textbooks	1. Романова, М. В. Управление проектами: учебное пособие - М. :ИД "ФОРУМ": ИНФРА-М, 2014. - 256 с. 2. Заренков, В. А. Управление проектами: учеб. пособие / В. А. Заренков. – 2-е изд. – М. : Изд-во АСВ, 2006. 3. Project Management Resource Center [Electronic resource]. – Mode of access: http://www.allpm.com, free. 4. Абдыгаппарова С.Б., Адилова А.М. Управление государственными проектами и программами //Вестник КазНУ. – 2015. - №4 (110) – С. 52-57.. 5. International Project Management Association [Electronic resource]. – Mode of access: http://www.ipma.ch, free. 6. Международный стандарт по управлению проектами ISO 21500:2012 – GuidanceonprojectmanagementISO, 2012. - 36с. 7. Конкурсная документация по государственным закупкам услуг способом конкурса по отбору научных проектов по предоставлению грантов для выполнения инициативных и рисковых научных исследований и разработок - http:// www.scedu.kz 8. ГОСТ 7.32-2001. Отчет о научно-исследовательской работе: структура и правила оформления. – Минск, 2006.
Update date	30.06.2018

Moduletitle	Modern technologies of complex-mixed fertilizers
Department responsible for the module	Department “Chemical technology of inorganic substances”
Type of module	Moduleof “Chemicaltechnologyofinorganic substances” trajectory
Level of module	PhD doctorate
Number of hours/week	4
Number of credits	6 ECTS (Lectures - 3, laboratory classes - 3)
Form of training	Fulltime
Semester	1 semester
Number of students	12
Module prerequisites	Chemistry and technology of inorganic substances, Bases of modern technology of processing mineral raw materials
Module post requisites	Researchpractice, Doctoralresearch, Doctoral thesis and defense

Module contents	**Lectures:**Trends in the development of the production of complex-mixed mineral fertilizers. Prospective directions for the development of complex fertilizer production. Mixed and complex mixed fertilizers. Dry mixing. Production of fertilizer mixtures based on the principle of compatibility of fertilizer components. Calculation of the composition of fertilizer mixtures to obtain mixed fertilizers according to the diagram of a three-component system. The device, the principle of operation and the parameters of mixing plants. Complex mixed fertilizers based on phosphoric acid and nitric acid decomposition of natural phosphates.Selection of optimal technological regimes for obtaining nitroammophos and nitroammofoska, nitrophos and nitrophoska, carboammfoska. Liquid and suspended compound fertilizers. HCS based on thermal and one stripped off extraction polyphosphoric acid. Modern technologies for producing mixed fertilizers with the use of chemical production wastes containing trace elements, low-grade phosphate raw materials and additives that improve the quality of mineral fertilizers. **Laboratory classes:** New methods of obtaining complex-mixed fertilizers from poor phosphate raw materials for agricultural crops for various purposes. The technology of obtaining NPK-balanced fertilizers and unbalanced complex fertilizers for various soil types using phosphoric-acid technology. Calculation and preparation of the composition of dry mixtures, obtaining complex-mixed fertilizers based on industrial chemical waste.
Learning outcomes	After studying the module, the student should be able to: - analyze existing technologies of difficult-mixed fertilizers and approaches to process analysis; - describe the problematic issues of the production of mineral fertilizers and creatively address these problems; - calculate the composition of fertilizer mixtures to obtain mixed fertilizers; independently receive difficult-mixed fertilizers and determine their quality; - to improve the existing production for the processing of mineral and technogenic raw materials into complex-mixed fertilizers; to recommend the regime parameters of the processes of obtaining mixed fertilizers.
Finalcontrol	Exam
Current control forms	Mid-term control in the form of DSSDS, practical calculations,completing laboratory works
Module duration	1 semester
Recommended textbooks	1. Ильин А.П. Современные проблемы химической технологии неорганических веществ. Иван. гос. хим.технол. ун-т. – Иваново, 2011. - 133 с. 2. Бішимбаев У.К.,Жантасов К.Т., Молдабеков Ш., Петропавловский И.А., Дормешкин О.Б., Жантасова Д.М., Джанмулдаева Ж.К. Күрделі және күрделі аралас минералды тыңайтқыштардың технологиясы мен даму тенденциясы.Оқулық. - Шымкент: М.Әуезов атындагы ОҚМУ, 2015. 3. Жантасов К.Т., Искандиров М.З., Айбалаева К.Д., Алтеев Т.А., Новик Д.М., Жантасова Д.М. Современные технологии переработки минерального сырья. Учебник. – Шымкент: ЮКГУ им. М.Ауезова, 2015г. 4. Жантасов К., Искандиров М.З., Сахи М.С., Алтеев Т.А.Өнеркәсіптік химиялық және механикалық процестер/Оқулық. –Шымкент: М.Әуезов атындагы ОҚМУ, 2016. 5. Қадірбаева А., Жантасов К., Молдабеков Ш.Бейорганикалық тұзлар өндірісінің технологиялық есебі.Оқулық. - Шымкент: М. Әуезов атындагы ОҚМУ, 2015. 6. Haan A.B. Process Technology: An Introduction.- Berlin; Munich; Boston: Walter de Gruyter GmbH, 2015. — 471 p.

Update date	30.06.2018

Moduletitle	The latest advances in applied electrochemistry
Department responsible for the module	Department “Chemical technology of inorganic substances”
Type of module	Moduleof “Chemicaltechnologyofinorganic substances” trajectory
Level of module	PhD doctorate
Number of hours/week	4
Number of credits	6 ECTS (Lectures - 3, laboratory classes - 3)
Form of training	Fulltime
Semester	1 semester
Number of students	12
Module prerequisites	Chemistry and technology of inorganic substances, Bases of modern technology of processing mineral raw materials
Module post requisites	Researchpractice, Doctoralresearch, Doctoral thesis and defense
Module contents	**Lectures:** Advances in the field of applied electrochemistry. Historical stages of development. The influence of the composition of the solutions, temperature and impurities on the quality and structure of the cathode metal sediment. New methods of cleaning and regeneration of solutions. Current output in the solution circulation system. Consumption of metals in the electrolysis process. The formation of sludge and its processing. Modern galvanic cells and batteries. Theory of work and electrode processes during charging and discharging. Prospects and value of fuel cells. Modern methods of applying protective and decorative coatings. Technological parameters of galvanic galvanizing processes, cadmium plating and copper plating. Coating of noble metals (silver, gilding).The value of hydroelectrometallurgy in industry. Hydrometallurgy of zinc and cadmium. Innovative methods of recycling waste electrochemical processes. The advantages of chemical coatings and their applications. Features of the application of metallic coatings on dielectric materials. **Laboratory:** Investigation of the charge and discharge characteristics of lead and alkaline batteries. Comparative analysis of the processes of electrochemical copper plating and nickel plating. Chemical nickel plating of solid inorganic and organic materials. Galvanic zinc plating. Investigation of coating processes of noble and rare metals. Electrolytic refining of copper, lead, nickel.
Learning outcomes	After studying the module, the student should be able to: - apply knowledge of laws and technologies of electroplating processes in future professional activities; - compare the laws and regime parameters of electrochemical and chemical processes; - perform a technical and economic analysis of various ways of producing the same product or products of different quality; - choose a rational technological scheme of electrochemical production; - recommend the optimal parameters for the electrochemical process.
Finalcontrol	Exam
Current control forms	Mid-term control in the form of DSSDS, practical calculations
Module duration	1 semester
Recommended textbooks	Томилов А.П. Прикладная электрохимия. -М.: Химия,1999. 2. Кошкарбаева Ш.Т., Сатаев М.С. Технология гальванических покрытий. Учебное пособие. -Шымкент: 2012. - 108 с. (Каз. яз.) 3. Сатаев М.С, КошкарбаеваШ.Т., Тукибаева А.С. Коррозия и защита металлов. Учебное пособие.-Шымкент: ЮКГУ им М.Ауезова, 2009. -144 с. (Каз.яз.)

	4. Шиблева Т.Г., Шмидберский П.А. Методы повышения коррозионной стойкости и износостойкости конструкций. Лабораторный практикум. – Тюмень: ООО «Тюменский Дом печати, 2007. – 80 с. 5. Кулешов Н.В., Фатеев В.Н., Осина М.А., Наноматериалы и нанотехнологии в электрохимических системах. - МЭИ, 2010.
Update date	30.06.2018

Moduletitle	Technology of nitric acid processing of phosphate raw materials
Department responsible for the module	Department “Chemical technology of inorganic substances”
Type of module	Moduleof “Chemicaltechnologyofinorganic substances” trajectory
Level of module	PhD doctorate
Number of hours/week	4
Number of credits	6 ECTS (Lectures - 3, laboratory classes - 3)
Form of training	Fulltime
Semester	1 semester
Number of students	12
Module prerequisites	Chemistry and technology of inorganic substances, Bases of modern technology of processing mineral raw materials
Module post requisites	Researchpractice, Doctoralresearch, Doctoral thesis and defense
Module contents	**Lectures**: Theoretical bases of nitric acid processing of natural phosphates. The effect of decomposition temperature, concentration and norms of nitric acid on the degree of extraction of P2O5 from phosphates. The chemistry of the process of nitric acid processing of natural phosphates. The kinetics of the decomposition of phosphates by nitric acid. The influence of the degree of grinding of phosphate and mixing of reagents on the degree of extraction of P2O5. Properties of nitric-phosphoric acid solutions. The chemical and dispersion composition of the insoluble residue in the nitric acid decomposition of phosphates. Isolation of nitric acid solution of fluoride compounds, phosphates of rare-earth elements. Ways to remove excess calcium from nitric acid extracts. Nitrogen-carbonate method of processing nitric acid extract. Technological schemes for the production of nitrophosphate nitric-sulfuric acid and nitrogen-sulfate methods, their distinctive features. Advantages of the nitrogen-phosphoric acid method of decomposition of phosphate raw materials. Features of the production of azophoska according to the method with the polythermal crystallization of calcium nitrate. Methods of processing nitric acid extracts into mineral fertilizers, the mechanism and chemistry of ammonization of extracts. Characteristics of solid phases that fall out during the neutralization of nitric-phosphoric acid solutions. Advantages and disadvantages of nitric acid processing of low-grade Karatau phosphorites. **Laboratory classes**: The study of the nitric acid decomposition of phosphate Karatau. Characteristics of solid phases, precipitated by the decomposition of phosphate raw materials and the neutralization of nitric-phosphate solutions. Chemical analysis of nitric acid extract: determination of total calcium, free nitric and phosphoric acid. Determination of the yield of calcium nitrate after freezing AKV. The study of the process of neutralization of nitric acid extract with gaseous ammonia. Analysis of the quality of complex fertilizers obtained by the nitric acid method.
Learning outcomes	After studying the module, the student should be able to: - analyze the technological features of the nitric acid decomposition of mineral raw materials and industrial wastes; - apply knowledge of the basic laws of nitric acid processing of natural phosphates to select the technological parameters of the production of

	complex mineral fertilizers; - to interpret the main provisions of the mechanism of acid processes for the processing of mineral and technogenic raw materials; - - to offer effective ways of processing nitric acid extracts taking into account the composition of phosphate raw materials.
Finalcontrol	Exam
Current control forms	Mid-term control in the form of DSSDS, practical calculations
Module duration	1 semester
Recommended textbooks	1. Бишімбаев У.Қ., Жантасов Қ.Т. және т.б. Минералды тыңайтқыштар және тұздар. Оқулық. – Шымкент: ОҚМУ, 2015. - 484 б. 2. Жантасов К.Т., Искандиров М.З., Айбалаева К.Д., Алтеев Т.А., Новик Д.М., Жантасова Д.М. Современные технологии переработки минерального сырья. Учебник. – Шымкент: ЮКГУ им. М.Ауезова, 2015г. 3. Ильин А.П. Современные проблемы химической технологии неорганических веществ. Иван. гос. хим.технол. ун-т. – Иваново, 2011. - 133 с. 4. Шевченко Т.М., Тихомирова А.В. Химическая технология неорганических веществ. Основные производства. Учебное пособие. – Кемерово, КузГТУ, 2012. - 196 с. 5. Бішимбаев У.К.,Жантасов К.Т., Молдабеков Ш., Петропавловский И.А., Дормешкин О.Б., Жантасова Д.М., Джанмулдаева Ж.К. Күрделі және күрделі аралас минералды тыңайтқыштардың технологиясы мен даму тенденциясы.Оқулық. - Шымкент: М.Әуезов атындагы ОҚМУ, 2015.
Update date	30.06.2018

Moduletitle	New methods for producing composite coatings
Department responsible for the module	Department “Chemical technology of inorganic substances”
Type of module	Moduleof “Chemicaltechnologyofinorganic substances” trajectory
Level of module	PhD doctorate
Number of hours/week	4
Number of credits	6 ECTS (Lectures - 3, laboratory classes - 3)
Form of training	Fulltime
Semester	1 semester
Number of students	12
Module prerequisites	Chemistry and technology of inorganic substances, Bases of modern technology of processing mineral raw materials
Module post requisites	Researchpractice, Doctoralresearch, Doctoral thesis and defense
Module contents	**Lectures**: Modern methods of preparing the surface of metal products before applying composite coatings. Classes and types of modern composite materials. Characteristics of composite electrochemical and chemical coatings. Physico-chemical basis of the production of new composite coatings. The mechanism of electrocrystallization when applying composite coatings. Effect of electrolyte composition on the structure of composite coatings. Factors affecting the production of composite coatings. Composite and multilayer coatings. Composite coatings based on nickel, copper, zinc and chromium. The use of various surfactants to obtain composite coatings. **Laboratory classes:** Investigation of the effect of various parameters on the dispersing ability of electrolytes to obtain composite coatings. The study of the influence of various types of surfactants on the property of copper, zinc coatings. Obtaining a functional electrolytic copper-nickel coating. Production of composite coatings by galvanic-chemical method.

Learning outcomes	After studying the module, the student should be able to: - compare the laws of electrochemical processes with the laws of chemical processes; - describe the production of chemicals and compounds by the electrochemical method; - to calculate the theoretical and practical costs of reagents, energy, electrochemical indicators of processes, analysis of composite coatings; - choose a rational technological scheme for the production of electrochemical products; - recommend the optimal parameters for the process of obtaining composite coatings.
Finalcontrol	Exam
Current control forms	Mid-term control in the form of DSSDS, practical calculations,completing laboratory works
Module duration	1 semester
Recommended textbooks	1. Дамаскин, Б.Б. Электрохимия: учебник для вузов / Б.Б. Дамаскин, О.А. Петрий, Г.А. Цирлина. – М.: Химия, 2001.- 624 с. 2. Кошкарбаева Ш.Т., Сатаев М.С. Технология гальванических покрытий. Учебное пособие. -Шымкент.: 2012 г. - 108 с. (Каз. яз.) 3. N. Perez, Electrochemistry and Corrosion Science, 2004, 376 p. 4. Сатаев М.С, КошкарбаеваШ.Т., Тукибаева А.С. Коррозия и защита металлов. Учебное пособие. - Шымкент: ЮКГУ им М Ауезова, 2009. - 144 с. (Каз.яз.) 5. Шиблева Т.Г., Шмидберский П.А. Методы повышения коррозионной стойкости и износостойкости конструкций. Лабораторный практикум. – Тюмень: ООО «Тюменский Дом печати, 2007. – 80 с.
Update date	30.06.2018

Moduletitle	Module of Professional Competence Development: 1) Pedagogical practice 2) Research practice 3) Doctoral research	
Department responsible for the module	Department “Chemical technology of inorganic substances”	
Type of module	Additionalmodulesbeyondthescopeofqualification	
Level of module	PhD doctorate	
Number of credits	For the entire module: 141 ECTS	1) Pedagogical practice: 9 ECTS; 2) Research practice: 17ECTS; 3) Doctoral research: 115ECTS
Semesters	1) Pedagogical practice – 1-2semester, 2) Research practice – 3 semester, 3) Doctoral research – 2-6semester,	
Module prerequisites	1) Pedagogical practice: Pedagogy, Psychology, 2) Research practice, doctoral research: Innovative technologies of inorganic substances, Methodology of scientific research, Optimization of chemical-and-technological processes, Management of scientific projects of inorganic compounds’productions, Management of scientific projects of electrochemical productions, Modern technologies of complex-mixed fertilizers, Latest advances in applied electrochemistry, Technology of nitric acid phosphate raw materials, New methods for producing composite coatings.	
Module postrequisites	Doctoral dissertation and defense	
Module contents	**1) Pedagogical practice**. Passage of pedagogical practice is aimed at instilling the pedagogical competencies of compiling EMCD, conducting training sessions. The trainee should develop and coordinate with the supervisor	

	methodological support of the discipline, including the justification of the relevance of the topic of the lesson, its relationship with the previous topics of the course, presentations and tasks for practical exercises; Doctoral students should practice conducting classes at the undergraduate and graduate levels in the presence of the teacher responsible for the discipline. **2) Research practice.** The content of research practice is determined by the theme of the doctoral dissertation. The work on the collection and processing of theoretical, normative and methodical materials is determined by the content of the first, theoretical, part of the final qualifying work (doctoral dissertation). The research practice of the doctoral candidate is carried out with the purpose of studying the latest theoretical, methodological and technological achievements of domestic and foreign science, as well as consolidating practical skills, applying modern methods of scientific research, processing and interpreting experimental data in the dissertation research. **3) Doctoral research**. The research work of the doctoral candidate includes the implementation of practical (experimental) sections of the dissertation in accordance with the work plan and the interpretation of the results of the research; it should correspond to the main problematics of the specialty for which the doctoral dissertation is defended, be relevant, contain scientific novelty and practical significance. The research and development work should be based on modern achievements of science, technology and production and contain specific practical recommendations, independent solutions of managerial tasks of an integrated, cross-functional nature, carried out using advanced information technologies.
Learning outcomes	After studying the module, the student should be able to: - demonstrate knowledge of the nature of the pedagogical and educational work of the teacher of higher education, teaching and methodological, organizational and methodological work of the department; - apply active teaching methods in the process of scientific and pedagogical activity in the university; - plan and effectively organize the educational process at the university; - select the necessary research methods (modify existing ones, develop new methods), based on the objectives of a specific study (on the topic of a doctoral dissertation or when performing tasks of a supervisor in a doctoral program); - to apply modern information technologies when conducting research; - process the obtained results, analyze and present them in the form of completed research and development (report on research work, abstracts, scientific articles, doctoral dissertation - organize, plan and implement the research process; - analyze, evaluate and compare various theoretical concepts in the field of research and draw conclusions; - to conduct an independent scientific study, characterized by academic integrity, based on modern theories and methods of analysis; - submit documentation for the protection of intellectual property rights to scientific discoveries and developments.
Finalcontrol	Report
Current control forms	1-6 semesters
Module duration	30.06.2018

Moduletitle	Pedagogical practice
Department responsible for the module	Department “Chemical technology of inorganic substances”

Type of module	Moduleof “Chemicaltechnologyofinorganic substances” trajectory
Level of module	PhD doctorate
Number of hours/week	9
Number of credits	9 ECTS (1 semester – 3, 2 semester - 6)
Form of training	Fulltime
Semester	1-2semester
Number of students	12
Module prerequisites	Pedagogy, Psychology
Module post requisites	Doctoral dissertation and defense
Module contents	The pedagogical practice is aimed at inculcating the pedagogical competencies of compiling the teaching and methodological complex, conducting training sessions using innovative active teaching methods. A trainee should familiarize himself with the method of conducting classes in a group of students, attend a teacher’s lesson, draw up a scenario for conducting a lecture, practical or laboratory lesson, develop and coordinate with the supervisor methodological support for the discipline and conduct a lesson in the discipline on the instructions of the supervisor.
Learning outcomes	After studying the module, the student should be able to: - demonstrate knowledge of the nature of the pedagogical and educational work of the teacher of higher education, teaching and methodological, organizational and methodological work of the department; - apply active methods of training and education, progressive situations of cooperation with students and undergraduates; - apply knowledge in the field of pedagogy of higher education in the process of scientific and pedagogical activity at the university; - plan and effectively organize the educational process at the university; - independently find sources of scientific and pedagogical information, samples of innovative and advanced pedagogical experience.
Finalcontrol	Report
Current control forms	Completed report, lecture notes
Module duration	2semesters
Recommended textbooks	1. Model rules of activity of educational organizations implementing educational programmes of higher and (or) postgraduate education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan from 30 October 2018 No. 595 (registered by the Ministry of Justice of the Republic of Kazakhstan, dated 31 October 2018, No. 17657); 2. State compulsory education standard SOESRK No. 1080 from 23.08.2012. as amended by the Government Decree of RK No. 2 92 from 13.05.2016.; 3. State obligatory standards of higher and postgraduate education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan, dated 31 October 2018, No. 604; 4. Rules for organization of the educational process on the credit technology of education, approved by anorder of the Minister of Education and Science of the Republic of Kazakhstan dated 20 April 2011, No. 152 with amendments and additions from 12 October 2018, #563; 5. Rules for organization of the educational process on the credit technology of education, approved by anorder of the Minister of Education and Science of the Republic of Kazakhstan dated 20 April 2011, No. 152 with amendments and additions from 12 October 2018, #563; 6. Interstate standard GOST 7.32-2001. System of standards on information, librarianship and publishing. ResearchReport. Structureanddesignrules.
Update date	30.06.2018

Moduletitle	Research practice
Department responsible for the module	Department “Chemical technology of inorganic substances”
Type of module	Moduleof “Chemicaltechnologyofinorganic substances” trajectory
Level of module	PhD doctorate
Number of hours/week	34
Number of credits	17ECTS
Form of training	Fulltime
Semester	3 semester
Number of students	12
Module prerequisites	Innovative technologies of inorganic substances, Research methodology, Optimization of chemical-technological substances, Management of scientific projects of inorganic compounds’ productions, Management of scientific projects of electrochemical production, Modern technologies of complex-mixed fertilizers, The latest advances in applied electrochemistry, Technology of nitric acid processing of phosphate raw materials, New methods for producing composite coatings
Module post requisites	Doctoral dissertation and defense
Module contents	The content of research practice is determined by the themes of the doctoral dissertation. The work on the collection and processing of theoretical, normative and methodical materials is determined by the content of the first, theoretical, part of the final qualifying work (doctoral dissertation). The research practice of the doctoral candidate is carried out with the purpose of studying the latest theoretical, methodological and technological achievements of domestic and foreign science, as well as consolidating practical skills, applying modern methods of scientific research, processing and interpreting experimental data in the dissertation research. Research practice is organized by the department of CTEI under contracts with leading enterprises, as well as leading universities and research institutes in the specialty profile.
Learning outcomes	After studying the module, the student should be able to: - select the necessary research methods (modify existing, develop new methods), based on the objectives of a specific study (on the topic of a doctoral dissertation or when performing tasks of a supervisor in a doctoral program); - to apply modern information technologies when conducting research; - process the obtained results, analyze and present them in the form of completed research and development (report on research work, abstracts, scientific articles, doctoral dissertation) - organize, plan and implement the research process; - own modern methods of data analysis and interpretation.
Finalcontrol	Report
Current control forms	Completed report
Module duration	1 semester
Recommended textbooks	1. Model rules of activity of educational organizations implementing educational programmes of higher and (or) postgraduate education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan from 30 October 2018 No. 595 (registered by the Ministry of Justice of the Republic of Kazakhstan, dated 31 October 2018, No. 17657); 2. State compulsory education standard SOESRK No. 1080 from 23.08.2012. as amended by the Government Decree of RK No. 2 92 from 13.05.2016.; 3. State obligatory standards of higher and postgraduate education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan, dated 31 October 2018, No. 604; 4. Rules for organization of the educational process on the credit technology

	of education, approved by anorder of the Minister of Education and Science of the Republic of Kazakhstan dated 20 April 2011, No. 152 with amendments and additions from 12 October 2018, #563; 5. Rules for organization of the educational process on the credit technology of education, approved by anorder of the Minister of Education and Science of the Republic of Kazakhstan dated 20 April 2011, No. 152 with amendments and additions from 12 October 2018, #563; 6 Interstate standard GOST 7.32-2001. System of standards on information, librarianship and publishing. ResearchReport. Structureanddesignrules.
Update date	30.06.2018

Moduletitle	Doctoral research
Department responsible for the module	Department “Chemical technology of inorganic substances”
Type of module	Moduleof “Chemicaltechnologyofinorganic substances” trajectory
Level of module	PhD doctorate
Number of hours/week	20
Number of credits	115ECTS (2 semester – 24, 3 semester – 13, 4 semester – 30, 5 semester – 30, 6 semester - 18)
Form of training	Fulltime
Semester	2-6 semester
Number of students	12
Module prerequisites	Innovative technologies of inorganic substances, Research methodology, Optimization of chemical-technological substances, Management of scientific projects of inorganic compounds’ productions, Management of scientific projects of electrochemical production, Modern technologies of complex-mixed fertilizers, The latest advances in applied electrochemistry, Technology of nitric acid processing of phosphate raw materials, New methods for producing composite coatings
Module post requisites	Doctoral dissertation and defense
Module contents	The research work of the doctoral candidate includes the implementation of practical (experimental) sections of the dissertation in accordance with the work plan and the interpretation of the results of the research; it should correspond to the main problematics of the specialty for which the doctoral dissertation is defended, be relevant, contain scientific novelty and practical significance. SRDS should be based on modern achievements of science, technology and production and contain specific practical recommendations, independent solutions of management tasks of an integrated, cross-functional nature, performed using advanced information technologies.Within the framework of the research and development work, the individual work plan of the doctoral candidate provides for the obligatory passage of scientific internships in scientific organizations and universities, including abroad, in order to become familiar with innovative technologies and new productions.
Learning outcomes	After studying the module, the student should be able to: - process the obtained results, analyze and present them in the form of completed research and development (report on research work, abstracts, scientific articles, doctoral dissertation - organize, plan and implement the research process; conduct independent scientific research, characterized by academic integrity, on the basis of modern theories and methods of analysis; - submit documentation for the protection of intellectual property rights to scientific discoveries and developments; - analyze production and technological documentation for the preparation of the thesis.

Finalcontrol	Report
Current control forms	Completed report
Module duration	3 semesters
Recommended textbooks	1. Model rules of activity of educational organizations implementing educational programmes of higher and (or) postgraduate education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan from 30 October 2018 No. 595 (registered by the Ministry of Justice of the Republic of Kazakhstan, dated 31 October 2018, No. 17657); 2. State compulsory education standard SOESRK No. 1080 from 23.08.2012. as amended by the Government Decree of RK No. 2 92 from 13.05.2016.; 3. State obligatory standards of higher and postgraduate education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan, dated 31 October 2018, No. 604; 4. Rules for organization of the educational process on the credit technology of education, approved by anorder of the Minister of Education and Science of the Republic of Kazakhstan dated 20 April 2011, No. 152 with amendments and additions from 12 October 2018, #563; 5. Rules for organization of the educational process on the credit technology of education, approved by anorder of the Minister of Education and Science of the Republic of Kazakhstan dated 20 April 2011, No. 152 with amendments and additions from 12 October 2018, #563; 6. Interstate standard GOST 7.32-2001. System of standards on information, librarianship and publishing. ResearchReport. Structureanddesignrules.
Update date	30.06.2018

Название модуля	Module of final certification	
Ответственный за модуль	Department “Chemical technology of inorganic substances”	
Тип модуля	Final certification	
Уровень модуля	PhD doctorate	
Количество кредитов	For the entire module: 12ECTS	Doctoral thesis and defense, 12ECTS
Семестр	6 семестр	
Пререквизиты модуля	Pedagogical practice,Research practice, doctoral research, Innovativetechnologiesofinorganicsubstances, Researchmethodology,Optimization of chemical-technological substances, Management of scientific projects of inorganic compounds’ productions, Management of scientific projects of electrochemical production, Modern technologies of complex-mixed fertilizers, The latest advances in applied electrochemistry, Technology of nitric acid processing of phosphate raw materials, New methods for producing composite coatings	
Постреквизиты модуля		
Содержание модуля	A doctoral thesis should correspond to the main problems of the specialty, be relevant, have a scientific novelty and practical importance, based on modern theoretical, methodological and technological achievements of science and practice, performed using modern methods of scientific research, based on modern methods of data processing and interpretation. technologies. The thesis should contain research (methodical, practical) sections on fundamental defended positions.The thesis is carried out in compliance with the principles of independence, internal unity, scientific novelty, reliability and practical value. The volume of the thesis for the degree of Doctor of Philosophy (PhD) is standardized in accordance with the Interstate standard for the design of dissertation works. Doctoral dissertations are defended in accordance with the procedure under the Dissertation Council for the specialty 6D072000 -	

	Chemical technology of inorganic substances in accordance with the Model Regulations on the Dissertation Council and the Rules for Awarding Scientific Degrees after the dissertation of a doctoral candidate at an expanded meeting of the department. The defense assesses the relevance of the chosen topic, the degree of validity of scientific statements, conclusions, recommendations formulated in the thesis and its practical significance, their novelty, and also gives a conclusion about the possibility of awarding the degree of Doctor of Philosophy (PhD) in the relevant specialty.
Результаты обучения	After studying the module, the student should be able to: - select the necessary research methods (modify existing, develop new methods), based on the objectives of the research on the topic of a doctoral dissertation or when performing tasks of a supervisor as part of a doctoral program; - defend the main provisions of the dissertation research at the meeting of the Dissertation Council; - process the obtained results, analyze and present them in the form of completed research and development (scientific article, doctoral dissertation); - conduct an independent scientific study, characterized by academic integrity; - submit documentation for the protection of intellectual property rights to scientific discoveries and developments; - critically evaluate accumulated experience, to reflect professional and social activities; - possess the knowledge of relevant related disciplines necessary to solve theoretical and applied problems; - possess skills in analyzing and structuring the technical formulation of the problem.
Форма итогового контроля	Doctoral thesis defense
Продолжительность модуля	
Литература	1. Model rules of activity of educational organizations implementing educational programmes of higher and (or) postgraduate education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan from 30 October 2018 No. 595 (registered by the Ministry of Justice of the Republic of Kazakhstan, dated 31 October 2018, No. 17657); 2. State compulsory education standard SOESRK No. 1080 from 23.08.2012. as amended by the Government Decree of RK No. 2 92 from 13.05.2016.; 3. State obligatory standards of higher and postgraduate education, approved by an order of the Minister of Education and Science of the Republic of Kazakhstan, dated 31 October 2018, No. 604; 4. Rules for organization of the educational process on the credit technology of education, approved by anorder of the Minister of Education and Science of the Republic of Kazakhstan dated 20 April 2011, No. 152 with amendments and additions from 12 October 2018, #563; 5. Rules for organization of the educational process on the credit technology of education, approved by anorder of the Minister of Education and Science of the Republic of Kazakhstan dated 20 April 2011, No. 152 with amendments and additions from 12 October 2018, #563; 6. Interstate standard GOST 7.32-2001. System of standards on information, librarianship and publishing. ResearchReport. Structureanddesignrules.
Дата обновления	30.06.2018

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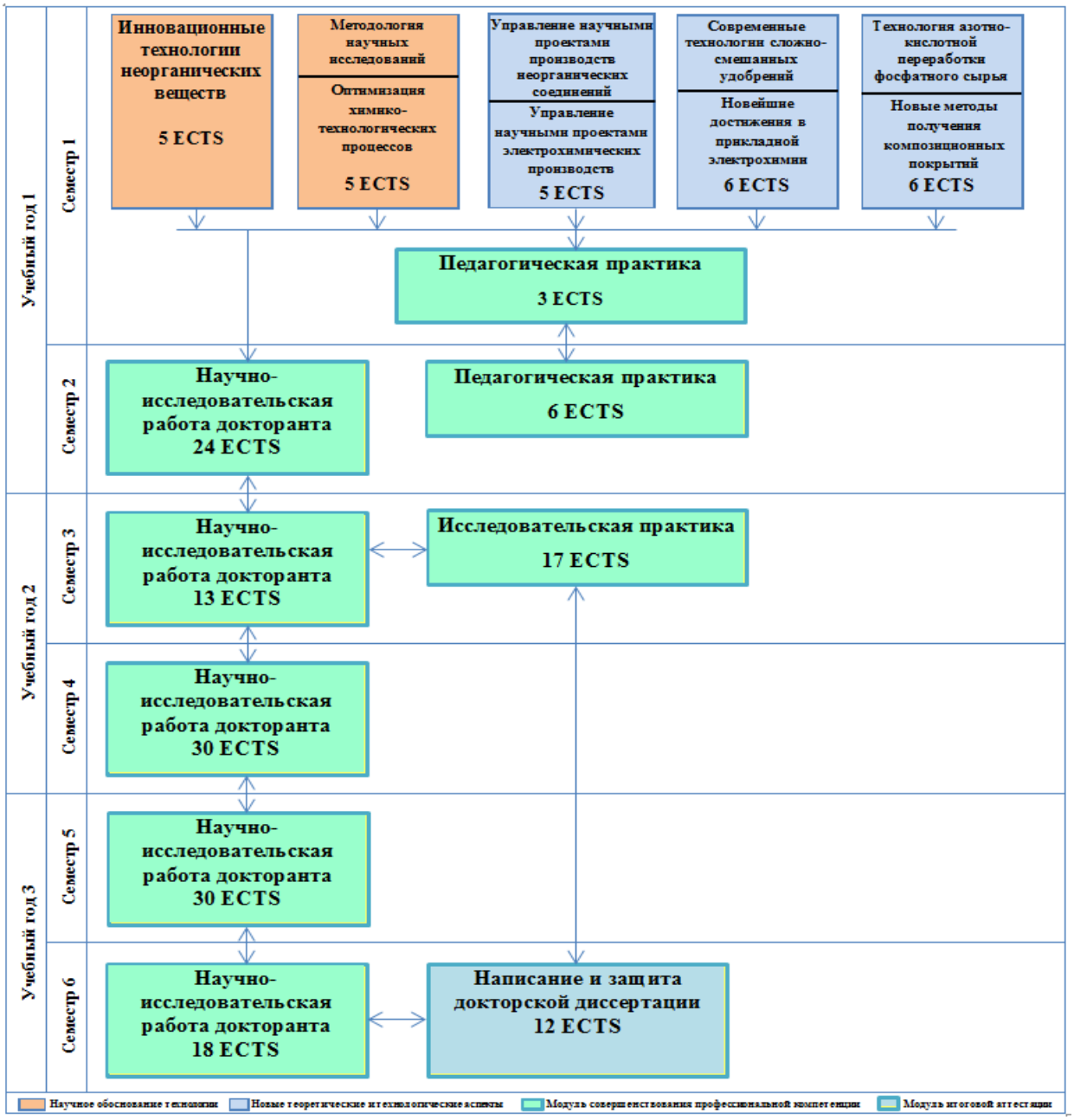
6. Structure of modular educational programme



7. ЛИСТ СОГЛАСОВАНИЯ

Директор ДАВ/ЦПВО _____ Ф.И.О.
подпись

Директор НИУ _____ Ф.И.О.
подпись

Директор ДНиП _____ Ф.И.О.
подпись

Annex 1

Bases of practices

#	Kind of professional practice	Title of enterprise
1	Pedagogical	M. Auezov South Kazakhstan State University, “Chemical technology of inorganic substances” Department
2	Research	LLP “KazNIIKhimproekt”, Shymkentcity
		LLP “Kazphosphate”, Tarazcity,
		LLP “KazAzot”, Aktaucity
		LLP "KazAtomprom", Suzakdistrict
		M. AuezovSKSU, TestingRegionalEngineeringLaboratory “ConstructionandBiochemicalMaterials”
		M. Auezov SKSU, Laboratory of Physical-Chemical Methods of Analysis “SAPA”

Annex 2. Expert opinion, reviews on the Educational program of employers and scientists of foreign universities

Экспертное заключение

на модульную образовательную программу
«Химическая технология неорганических веществ»
по специальности 6D072000-Химическая технология неорганических веществ

1. Актуальность ОП. В рамках Государственной программой развития образования Республики Казахстан на 2011-2020 годы перед высшей школой поставлена задача выполнения параметров Болонской декларации. Факультативным параметром Болонского процесса является модульная система обучения, которая имеет большую значимость в планировании и организации учебного процесса с учетом интересов работодателей и запросов общества. Применение которой в значительной мере повысить эффективность и качество подготовки специалистов.

Поэтому в целях реализации процесса вхождения Казахстана в европейское образовательное пространство, приведения в соответствие требованиям кредитной технологии обучения, преодоления высокой раздробленности дисциплин, слабой междисциплинарной связи создание образовательной программы «Химическая технология неорганических веществ» по специальности 6D072000-Химическая технология неорганических веществявляется весьма актуальной.

2. Соответствие ОП сформулированным целям, согласующимся с миссией вуза, запросами работодателей и студентов. Цель образовательной программы «Химическая технология неорганических веществ»согласована с миссией вуза, запросами работодателей и студентов, что подтверждается необходимостью подготовки специалистов, владеющих теоретическими и практическими знаниями в конкретной области, владеющими методами и инструментами сложной и специализированной области и умеющих применять полученные знания, оценивать и анализировать современное состояние развития производства, а также способных формулировать и принимать эффективные решения задач производственного характера.

Модульная система и связанные с ее введением интенсификация информационно-деятельного процесса обучения, система контроля знаний и профессиональной пригодности может в значительной мере повысить эффективность и качество подготовки специалистов, обеспечить целенаправленность творческой деятельности личности.

3. Соответствие Национальной рамке квалификаций Республики Казахстан. Национальная квалификационная рамка – это гармонизация национальной системы образования с европейской. Национальная рамка квалификаций наряду с отраслевыми рамками и профессиональными стандартами входит в Национальную систему квалификаций. На ее основе разработаны отраслевые рамки квалификаций в сферах образования и науки, труда, сельского хозяйства.Национальная рамка квалификаций в Казахстане разработана и утверждена протоколом РТК от 16.03.2016. Образовательная программа «Химическая технология неорганических веществ» соответствует 8 уровню Национальной рамки квалификаций Республики Казахстан.

4. Отражение в ОП результатов обучения и компетенций, основанных на Дублинских дескрипторах, заложенных в профессиональных стандартах/ отраслевых рамках. Результаты обучения выражены через компетенции и проектированы на основании Дублинских дескрипторов квалификации 3 циклом Квалификационной Рамки Европейского Пространства Высшего Образования (A Framework for Qualifications of the European Higher Education Area), а также 8 уровнем Европейской квалификационной рамки образования в течение всей жизни (The European Qualifications Framework for Lifelong Learning). Результаты обучения и компентенции соответствуют приобретению выпускником докторантуры навыков критического анализа, оценки и сравнения

различных научных теорий и идей; планирования, координирования и реализации процессов научных исследований; проведения патентного поиска и опыта передачи научной информации с использованием современных информационных и инновационных технологий и свободного общения на иностранном языке.

5. Соответствие ГОСО, ТУПл, ТУПр. Модульная образовательная программа разработана в соответствии с ГОСО ВО/ПВО, утвержденного постановлениемПравительства РК от 23 августа 2012 года № 1080 с изменениями и дополнениями от 13 мая 2016 года №292, типовым учебным планом специальности 6D072000-Химическая технология неорганических веществ, утвержденного приказом МОН РК № 425 от 05.07.2017, профессиональным стандартом/ отраслевой рамкой квалификации.

6. Структура и содержание ОП, применение модульного принципа построения. Образовательная программа «Химическая технология неорганических веществ» содержит модули совершенствования профессиональной компетенции, формирующие умения выявлять научную сущность проблем в профессиональной области и определять потребности общества в продукции химической технологии неорганических веществ.

7. Наличие в ОП компонентов для подготовки к профессиональной деятельности, развивающих ключевые компетенции, интеллектуальные и академические навыки, отражающие изменяющиеся требования общества, в том числе по реализации президентской программы по овладению тремя языками: казахским, русским и английским. Образовательная программа состоит из модуля специальности («Инновационные технологии неорганических веществ», «Методология научных исследований», «Оптимизация химико-технологических процессов»), модуля траектории и модуля совершенствования профессиональной компетенции.

8. Логическая последовательность дисциплин и отражение основных требований в учебных планах и программах обучения. В модульной образовательной программе«Химическая технология неорганических веществ» по специальности 6D072000-Химическая технология неорганических веществ четко прослеживается логическая последовательность изучения дисциплин, что отражено в таблице «Содержание образовательной программы».

9. Отражение в ОП системы учета учебной нагрузки докторантов и преподавателей в кредитах, ее соответствие параметрам кредитной системы обучения. Система учета учебной нагрузки докторантов и преподавателей в кредитах представлена в сводной таблице, отражающей объем освоенных кредитов в разрезе модулей образовательной программы.

10. Наличие в программах производственной практики для закрепления теоретического материала, выраженного в учебной нагрузке в кредитах. В рамках образовательной программы «Химическая технология неорганических веществ» предусмотрена исследовательская практика, целью которой является изучение новейших теоретических, методологических и технологических достижений отечественной и зарубежной науки, закрепление практических навыков, применение современных методов сбора, обработки и интерпретации экспериментальных данных в диссертационном исследовании.

11. Сведения о ППС, участвующих в реализации ОП. Сведения о ППС, участвующих в реализации ОП, представлены в виде модульного справочника. Модульный справочник является необходимым компонентом кредитной технологии обучения, обеспечивающим выборность преподавателя и траектории обучения. В модульном справочнике представлены данные о преподавателе, о распределении кредитов, видах занятий, уровне модуля, количестве кредитов, форме обучения, пререквизитах и постреквизитах модуля, содержании модуля, результатах обучения, форме итогового контроля.

12. Квалификация, получаемая в результате освоения ОП. Выпускнику по данной ОП Химическая технология неорганических веществ присуждается степень «Доктора философии PhD по специальности 6D072000-Химическая технология неорганических веществ». Доктора философии PhD по специальности 6D072000-Химическая технология неорганических веществ могут занимать руководящие должности в (научно-исследовательских учреждениях, конструкторских и проектных организациях, проектных организациях и организациях образования) без предъявления требований к стажу работы в соответствии с квалификационными требованиями Квалификационного справочника должностей руководителей, специалистов и других служащих, утвержденного приказом министра труда и социальной защиты населения Республики Казахстан от 21 мая 2012 года № 201-ө-м.

13. Рекомендация. Из вышеуказанного следует, что модульная образовательная программа «Химическая технология неорганических веществ» по специальности 6D072000-Химическая технология неорганических веществ, разработанная в ЮКГУ им.М.Ауэзова, составлена

на высоком профессиональном уровне и может быть рекомендована для использования в организации учебного процесса послевузовского образования 8 уровня Национальной рамки квалификаций Республики Казахстан.

Председатель экспертной комиссии, к.т.н., доцент	Айтуреев М.Ж.
Члены экспертной комиссии: к.т.н., доцент	Каратаева Н.Е.
к.х.н., доцент	Бимбетова Г.Ж.
к.х.н., доцент	Нарымбаева З.К.

РЕЦЕНЗИЯ

на модульную образовательную программу

«Химическая технология неорганических веществ» по специальности 6D072000-Химическая технология неорганических веществ, разработанной в ЮКГУ им. М. Ауэзова, г.Шымкент

1. Краткая характеристика предприятия и профиль ее деятельности. ТОО «Казфосфат» - крупнейшее химическое предприятие Казахстана, являющееся лидирующей компанией по производству фосфорсодержащей продукции на территории стран СНГ. Предприятие имеет в своей собственности полную линию от добычи до поставки фосфатов и их переработки в конечные продукты — желтый фосфор, серную и фосфорные кислоты, фосфорные и сложные минеральные удобрения, технические, кормовые и пищевые фосфаты. Деятельность компании направлена на решение приоритетных задач по развитию предприятий химической подотрасли Казахстана, выход на мировые рынки с качественной конкурентоспособной продукцией, создание имиджа Республики Казахстан как поставщика высокотехнологичных товаров, являющихся результатом высокого уровня переработки сырья. Предприятие уделяет большое внимание подготовке инженерных кадров и участвует в учебно-научнопроизводственном комплексе с университетами, осуществляющими обучение докторантов по специальности «Химическая технология неорганических веществ».

2. Актуальность и востребованность ОП. Образовательная программа «Химическая технология неорганических веществ» соответствует 6 уровню Национальной рамки квалификаций Республики Казахстан, они также гармонизированы с Дублинскими дескрипторами, 1 циклом Квалификационной Рамки Европейского Пространства Высшего Образования, а также 8 уровнем Европейской квалификационной рамки для образования в течение всей жизни. Целью образовательной программы «Химическая технология неорганических веществ» является подготовка специалистов, владеющих теоретическими и практическими знаниями в конкретной области, владеющими методами и инструментами сложной и специализированной области и умеющих применять полученные знания, оценивать и анализировать современное состояние развития производства, а также способных формулировать и принимать эффективные решения задач производственного характера. Функциями профессиональной деятельности докторанта является организация, обеспечение и контроль технологических процессов и эксплуатации технологического оборудования по производству неорганических веществ в соответствии с требованиями промышленного технологического регламента и технико-эксплуатационной документации; экспертиза и диагностика состояния и динамики объектов деятельности (технологических процессов, оборудования и т.п.); разработка технических заданий на проектирование новых и модернизацию существующих

технологических процессов, технологических линий и технологического оборудования.

3. Результаты обучения и компетенции, их связь с запросами рынка труда. Результаты обучения способствуют формированию профессиональных знаний по основным естественно-математическим наукам для практического применения, направленного на развитие технологии переработки минерального сырья, использованию информации для решения проблем в химической технологии неорганических веществ, умения описывать теоретические закономерности технологических процессов переработки минерального сырья и техногенных отходов с получением неорганических соединений. Выпускники образовательной программы востребованы на предприятиях химической промышленности как специалисты, способные оценивать и переосмысливать накопленный опыт, анализировать профессиональную и социальную деятельность.

4. Наличие "компонентов, развивающих практические навыки. Образовательная программа содержит общие и междисциплинарные модули, включающие естественно-математические, химические модули и профессиональные модули, необходимые для развития профессиональных навыков должностных квалификаций инженера, химика-технолога, инженера-технолога, научного сотрудника.

5. Содержание образовательной программы (модули, дисциплины). Образовательная программа содержит общие и междисциплинарные модули, включающие основы инженерно-технических наук, химической инженерии, профессиональной подготовки.

6. Качество модульного справочника. В образовательной программе «Химическая технология неорганических веществ» представлен модульный справочник с развернутыми данными по распределению кредитов, видам занятий, уровню модуля, количеству кредитов, ответственному лицу, форме обучения, пререквизитам и постреквизитам модуля, содержанию модуля, результатам обучения, форме итогового контроля. Модульный справочник является необходимым компонентом кредитной технологии обучения, обеспечивающей выборность преподавателя и траектории образования.

7. Заключение. Основываясь на вышеуказанных данных, модульная образовательная программа «Химическая технология неорганических веществ» по специальности 6D072000 - Химическая технология неорганических веществ, разработанная в ЮКГУ им. М. Ауэзова, составлена на высоком уровне и рекомендуется для использования в организации учебного процесса phD докторантуры 8 уровня Национальной рамки квалификаций Республики Казахстан.

Директор
Учебно-методического центра
ГОО «Казфосфат» Оразова М.А.

РЕЦЕНЗИЯ

на модульную образовательную программу «Химическая технология неорганических веществ» по специальности 6D072000-Химическая технология неорганических веществ, разработанной в ЮКГУ им. М. Ауэзова, г.Шымкент

1. Краткая характеристика предприятия и профиль ее деятельности. ТОО «КАЗНИИХИМПРОЕКТ» является центром по разработке новых химических технологий и организации на предприятиях новых химических производств, а также модернизации и реконструкции существующих предприятий. Научно-технические разработки института экспонировались на ВДНХ СССР и международных выставках в Москве, США, Канаде, ОАЭ, Китае, Словакии и неоднократно были награждены медалями и дипломами. По научно-техническим разработкам института были спроектированы, построены, введены в эксплуатацию производства на территории бывшего СССР в городах: Славянск, Артемовка (Украина), г.Чир-Юрт (Дагестан), г.Мелеуз (Башкортостан) г. Уварово, г.Братск, г.Красноярск, г.Пермь, (Россия), г.Алмалык (Узбекистан), г.Сумгаит (Азербайджан), г. Тараз, г.Актау, г.Костанай, г.Балхаш, г.Каратау, г. Жанатас, г.Демиртау,г. Шымкент.

2. Актуальность и востребованность ОП. В рамках реализации процесса вхождения Казахстана в европейское образовательное пространство создание образовательной программы «Химическая технология неорганических веществ» по специальности 5В072000-Химическая технология неорганических веществ является актуальной. Образовательная программа «Химическая технология неорганических веществ» по своему содержанию соответствует 6 уровню Национальной рамки квалификаций Республики Казахстан, она также гармонизирована с Дублинскими дескрипторами, 1 циклом Квалификационной Рамки Европейского Пространства Высшего Образования, а также с 6 уровнем Европейской квалификационной рамки для образования в течение всей жизни. Востребованность образовательной программы «Химическая технология неорганических веществ» определяется её целью, заключающейся в подготовке специалистов, владеющих теоретическими и практическими знаниями в конкретной области науки и производства и умеющих применять полученные знания, оценивать и анализировать современное состояние развития производства, а также способных формулировать и принимать эффективные решения задач производственного характера.

3. Результаты обучения и компетенции, их связь с запросами рынка труда. Результаты обучения по модульной образовательной программе способствуют формированию профессиональных знаний, необходимых для развития технологии переработки минерального и техногенного сырья, использованию информации для решения проблем в химической технологии неорганических веществ, умения описывать теоретические закономерности технологических процессов получения неорганических соединений. Выпускники образовательной программы как специалисты, способные

оценивать, анализировать профессиональную и социальную деятельность, востребованы на предприятиях химической промышленности.

4. Наличие компонентов, развивающих практические навыки. Образовательная программа содержит все модули, необходимые для развития профессиональных навыков и должностных квалификаций инженера, химика-технолога, инженера-технолога, научного сотрудника. К ним относятся общие и междисциплинарные модули, включающие естественно-математические, химические модули и профессиональные модули,

5. Содержание образовательной программы (модули, дисциплины). В состав модульной образовательной программы «Химическая технология неорганических веществ» входят общие и междисциплинарные модули, включающие основы инженерно-технических наук, химической инженерии, профессиональной подготовки.

6. Качество модульного справочника. Образовательная программа «Химическая технология неорганических веществ» представлена в виде модульного справочника с развернутыми данными по распределению кредитов, видам занятий, уровню модуля, количеству кредитов, ответственного лица, форме обучения, пререквизитам и постреквизитам модуля, содержанию модуля, результатам обучения, форме итогового контроля. Модульный справочник является необходимым компонентом кредитной технологии обучения, обеспечивающим выборность преподавателя и траектории образования.

7. Заключение. На основе сказанного следует, что модульная образовательная программа «Химическая технология неорганических веществ» по специальности 6D072000- Химическая технология неорганических веществ, разработанная в ЮКГУ им. М. Ауэзова, составлена на высоком профессиональном уровне и рекомендуется для использования в организации учебного процесса phD докторантуры 8 уровня Национальной рамки квалификаций Республики Казахстан.

Генеральный директор
ТОО «КАЗНИИХИМПРОЕКТ» Абралиев Е.Д

Отзыв
на Модульную образовательную программу ЮКГУ им.М.Ауэзова
«Химическая технология неорганических веществ»
для уровня образования PhD докторантура

Модульная ооразовательная программа «Химическая технология неорганических веществ» разработана в рамках специальности 6D072000-Химическая технология неорганических веществ.
После ознакомления с Программой считаю необходимым отметить следующее:

1. Цели программы «Подготовка конкурентоспособных высококвалифицированных специалистов, обладающих методологическими знаниями в области инновационно-исследовательской деятельности, способных к самостоятельному мышлению, формировать и реализовывать идеи научного развития в ооласти химической технологии неорганических веществ» и «Подготовка специалистов, свободно владеющих государственным и иностранным языками, владеющих навыками лидерского управления процессами и деятельностью коллектива, принятия решений и ответственности на уровне институциональных структур, анализа, оценки и реализации инновационных идей в профессиональной и социальной сфере» отвечают современным требованиям к подготовке кадров высшей квалификации и соответствуют международному уровню высшего образования;
2. Программа профессионально и грамотно изложена во всех аспектах требований к программам подобного уровня, хорошо структурирована и содержит все необходимые компоненты для приобретения компетенций выпускника докторантуры.
3. Логичным и обоснованным представляется введение в программу в модуле
«Научное обоснование технологии» дисциплин «Методология научных исследований» и «Оптимизация химико-технологических процессов» и в модуле «Новые теоретические и технологические аспекты» дисциплин «Управление научными проектами производств неорганических соединений»
и «Управление научными проектами электрохимических производств» для двух траекторий обучения.

В целом программа актуальна, современна и соответствует требованиям к уровню подготовки докторантов PhD.

Д.т.н., профессор
РХТУ им. Д.И. Менделеева Петропавловский И.А.

Annex 3. The contingent of PhD students on the educational program «Chemical technology of inorganic substances»and dataon the degree assigned

Form of study		Year of study			Postgraduate education	Degree awarded
		1	2	3		PhD
2018-2019	fulltime	12	8	2		PhD
2017-2018	fulltime	8	2	1		PhD
2016-2017	fulltime	2	1	3		PhD
2015-2016	fulltime	1	3	3		PhD
2014-2015	fulltime	3	3	2		PhD

Annex 4. Number of doctoral students per semesters for each educational program

Educational program / awarded academic степень	Academic year	Number of students per semester							
		1 semester	2semester	3semester	4semester	5semester	6semester	Total	Total
Chemical Technology of Inorganic Substances / PhD	September 2014/2015	3	3	3	3	3	3		3
Chemical Technology of Inorganic Substances / PhD	September 2015/2016	1	1	1	1	1	1		1
Chemical Technology of Inorganic Substances / PhD	September 2016/2017	2	2	2	2	2	2		2
Chemical Technology of Inorganic Substances / PhD	September 2017/2018	8	8	8	8				8
Chemical Technology of Inorganic Substances / PhD	September 2018/2019	12	12						12

Annex 5. Sheet of evaluation of lectures and practical classes

Ф. 8.04-02

Дәріс, практикалық және зертханалық сабақтарды бағалау және бақылау парағы
Лист наблюдения и оценки лекций, практического (семинарского) и лабораторного занятий (подчеркнуть)

Оқытушы/Преподаватель Жаимтасов Курманбек [illegible], д.т.н, профессор
Аты-жөні, ғылыми дәрежесі, лауазымы/Ф.И.О., ученая степень, должность

Факультеті, (Жоғарғы мектебі) Химическая инженерия и Б.Т Факультет (Высшая школа)
кафедра Химическая технология неорг. веществ Кафедра курс/курс, группа ДХ-17 [illegible] Тобы

Пәні Технологические основы получения сложно-смешанных [illegible] Дисциплина

Сабақтың тақырыбы/Тема учебного занятия Получение [illegible] сложно-смешанных минер. удобрений

Студенттердің саны (тізімі бойынша)/ Количество студентов (по списку) 14 человек

Қатысқандар/Присутствовало четыре = 100 % 30.10.2017 г
Өткізген күні,уақтысы, ауд/дата, время, аүд проведения

Сабақ тақырыбының КТЖ-мен сәйкестігі / Соответствие темы с КТП соответствует
Сәйкес келеді, сәйкес келмейді/соответствует, не соответствует

№	Көрсеткіштер/Показатели	Балдар/Баллы			
		2	3	4	5
1	Сабақ өту уақытын бөлу /Распределение времени на учебном занятии				✓
2	Тақырыптың ашылуы/Раскрытие темы				✓
3	Баяндаудың теориялық деңгейі (дәріс) /Теоретический уровень изложения (лекция)				✓
3.1	а) ғылыми-әдістемелік / научно-методический			✓	
	б) логикалық / логичность				✓
	в) жүйелілік / системность				✓
	г) реттік байланысы / последовательность				✓
	д) жеткізу дәрежесі / доступность				✓
3.2	б) Практикалық сабақты өткізу деңгейі/ Уровень проведения практических занятий				
3.3	в) Зертханалық сабақты өткізу деңгейі/ Уровень проведения лабораторных занятий				
4	Оқудың интерактивті әдістері мен дәстүрлі педагогикалық тәсілдердің әдістемелік рационалдық үйлесімділігі/Рациональное сочетание методических приемов традиционной педагогики и интерактивных методов обучения				✓
5	Оқу материалын игеру мен оқыту деңгейі/Знание материала и уровень его преподавания				✓
	а) оқытушы материалды еркін меңгерген, негізгі кезеңдерді ерекше атап өте алады, материалға тиесілі емес / преподаватель свободно владеет материалом, умеет выделить основные моменты, не привязан к материалам				✓
	б) ақпарат материалдарының басқа да жақын пәндермен байланысы/информационный материал увязан с другими смежными дисциплинами			✓	
	в) практикада қарастырылған жағдаяттардың нақтылы мәселесі, мысалы және есебі бар/содержит конкретные проблемы ситуации, примеры, задачи из практики				✓
6	Студенттердің зейінін ұйымдастыру/Организация внимания студентов				✓
	а) өздік жұмыстарының элементтері бар/присутствуют элементы самостоятельной работы				✓
	б) оқытушы топ студенттерінің жұмысын ұйымдастырады/преподаватель организует работу студентов в группах				✓
	в) шығармашылық жағдайды қалыптастырады/создает творческую обстановку				✓
7	Оқытудың техникалық құралдарын қолдануы/Использование технических средств обучения				✓
8	Аудиториямен қарым-қатынасы және керісінше, аудиторияның оқытушымен қарым-қатынасы/Контакт с аудиторией, наличие обратной связи				✓
9	Педагогикалық такт/Педагогический такт				✓
10	Сөйлеу сапасы/Качество речи				✓
	а) сөйлеу мәнері/дикция				✓
	б) сөйлеу мәдениеті/культура речи			✓	
	в) дауыс ырғағы/интонация				✓
11	Сабақтың тәрбиелік мәні/Воспитательная сторона занятия				✓
12	Сабақтың жалпы бағасы меңгерілетін позициялар ұстанымдары бойынша балдардың орташа-арифметикалық мәндерінен шығарылады /Общая оценка учебного занятия выводится, исходя из средне-арифметического значения баллов по всем изучаемым позициям.	4,88			

Ескерту/Примечание: Балдардың мәні: 5-біліктілік дәрісі; 4-толығымен талаптарға сай; 3-талаптарға сай қанағаттанарлық; 2-талаптарға қанағаттанарлықсыз./Баллы означают: 5 – квалифицированная лекция; 4 – удовлетворяет требованиям вполне; 3 – удовлетворяет требованиям; 2 – не удовлетворяет требованиям. Егер барлық ұстанымдар позициялар бойынша орташа балл 3,5-тен жоғары болса, сабақ ЖОО-да оқу процесін ұйымдастырудың қазіргі талаптарына сәйкес келеді./ Если средний балл по всем позициям выше 3,5балла, то занятие соответствует современным требованиям организации образовательного процесса в вузе,егер барлық ұстанымдар позициялар бойынша орташа балл 3,5 төмен болса,сабақ ЖОО-да оқу процесін ұйымдастырудың қазіргі талаптарына сәйкес келмейді,если средний балл по всем позициям ниже 3,5 балла,то занятие не соответствует требованиям организации образовательного процесса в вузе.

Сабаққа қатысқан/Посетивший учебное занятие д.т.н, профессор [illegible] А.С.
Аты-жөні, ғылыми дәрежесі, лауазымы, қолы/Ф.И.О., ученая степень, должность, подпись

Сабақтың бағасымен таныстым/С оценкой учебного занятия ознакомлен ____________
Қолы/Подпись

Басқа да ескертпелер мен ұсыныстар/Другие замечания и преложения: ____________

Ф. 8.04-02

Дәріс, практикалық және зертханалық сабақтарды бағалау және бақылау парағы
Лист наблюдения и оценки лекций, практического (семинарского) и лабораторного занятий (подчеркнуть)

Оқытушы/Преподаватель Алеуов С.Т. к.т.н., доцент
Аты-жөні, ғылыми дәрежесі, лауазымы/Ф.И.О., ученая степень, должность

Факультеті, (Жоғарғы мектебі) Химическая технология и биотехнология Факультет (Высшая школа)
кафедра Химической технологии неорг. в-в кафедрасы 1 курс/курс, группа 481-18-1 топы
Пәні Инновационные технологии неорганических веществ Дисциплина
Сабақтың тақырыбы/Тема учебного занятия Сочетание традиционных форм и методов с интерактивными
Студенттердің саны (тізімі бойынша)/ Количество студентов (по списку) 5
Қатысқандар/Присутствовало 4 = 80% % 03.12.2018г. 16^00, 323А.
Өткізген күні,уақтысы, ауд/дата, время, ауд проведения
Сабақ тақырыбының КТЖ-мен сәйкестігі / Соответствие темы с КТП соответствует
Сәйкес келеді, сәйкес келмейді/соответствует, не соответствует

№	Көрсеткіштер/Показатели	Балдар/Баллы			
		2	3	4	5
1	Сабақ өту уақытын бөлу /Распределение времени на учебном занятии				✓
2	Тақырыптың ашылуы/Раскрытие темы				✓
3	Баяндаудың теориялық деңгейі (дәріс) /Теоретический уровень изложения (лекция)				✓
3.1	а) ғылыми-әдістемелік / научно-методический б) логикалық / логичность в) жүйелілік / системность г) реттік байланысы / последовательность д) жеткізу дәрежесі / доступность				✓
3.2	б) Практикалық сабақты өткізу деңгейі/ Уровень проведения практических занятий				✓
3.3	в) Зертханалық сабақты өткізу деңгейі/ Уровень проведения лабораторных занятий				
4	Оқудың интерактивті әдістері мен дәстүрлі педагогикалық тәсілдердің әдістемелік рационалдық үйлесімділігі/Рациональное сочетание методических приемов традиционной педагогики и интерактивных методов обучения				✓
5	Оқу материалын игеру мен оқыту деңгейі/Знание материала и уровень его преподавания				
	а) оқытушы материалды еркін меңгерген, негізгі кезеңдерді ерекше атап өте алады, материалға тиесілі емес / преподаватель свободно владеет материалом, умеет выделить основные моменты, не привязан к материалам				✓
	б) ақпарат материалдарының басқа да жақын пәндермен байланысы/информационный материал увязан с другими смежными дисциплинами				✓
	в) практикада қарастырылған жағдаяттардың нақтылы мәселесі, мысалы және есебі бар/содержит конкретные проблемы ситуации, примеры, задачи из практики				✓
6	Студенттердің зейінін ұйымдастыру/Организация внимания студентов				✓
	а) өздік жұмыстарының элементтері бар/присутствуют элементы самостоятельной работы				
	б) оқытушы топ студенттерінің жұмысын ұйымдастырады/преподаватель организует работу студентов в группах				✓
	в) шығармашылық жағдайды қалыптастырады/создает творческую обстановку			✓	
7	Оқытудың техникалық құралдарын қолдануы/Использование технических средств обучения				✓
8	Аудиториямен қарым-қатынасы және кері сіпше, аудиторияның оқытушымен қарым-қатынасы/Контакт с аудиторией, наличие обратной связи				✓
9	Педагогикалық такт/Педагогический такт				
10	Сөйлеу сапасы/Качество речи				✓
	а) сөйлеу мәнері/дикция				✓
	б) сөйлеу мәдениеті/культура речи				✓
	в) дауыс ырғағы/интонация				✓
11	Сабақтың тәрбиелік мәні/Воспитательная сторона занятия				✓
12	Сабақтың жалпы бағасы меңгерілетін позициялар ұстанымдары бойынша балдардың орташа-арифметикалық мәндерінен шығарылады /Общая оценка учебного занятия выводится, исходя из средне-арифметического значения баллов по всем изучаемым позициям.	4,95			

Ескерту/Примечание: Балдардың мәні: 5-біліктілік дәрісі; 4-толығымен талаптарға сай; 3-талаптарға сай қанағаттанарлық; 2-талаптарға қанағаттанарлықсыз./Баллы означают: 5 – квалифицированная лекция; 4 – удовлетворяет требованиям вполне; 3 – удовлетворяет требованиям; 2 – не удовлетворяет требованиям. Егер барлық ұстанымдар позициялар бойынша орташа балл 3,5-тен жоғары болса, сабақ ЖОО-да оқу процесін ұйымдастырудың қазіргі талаптарына сәйкес келеді./ Если средний балл по всем позициям выше 3,5балла, то занятие соответствует современным требованиям организации образовательного процесса в вузе,егер барлық ұстанымдар позициялар бойынша орташа балл 3,5 төмен болса,сабақ ЖОО-да оқу процесін ұйымдастырудың қазіргі талаптарына сәйкес келмейді,если средний балл по всем позициям ниже 3,5 балла,то занятие не соответствует требованиям организации образовательного процесса в вузе.

Сабаққа қатысқан/Посетивший учебное занятие Ташенбаева Ш.Т. к.т.н., доцент
Аты-жөні, ғылыми дәрежесі, лауазымы, қолы/Ф.И.О., ученая степень, должность, подпись

Сабақтың бағасымен таныстым/С оценкой учебного занятия ознакомлен
Қолы/Подпись

Басқа да ескертпелер мен ұсыныстар/Другие замечания и преложения:
Занятие проведено на высоком научно-теоретическом уровне

Annex 6. The results of the survey "Teacher from doctoral student view"

Higher School of Chemical Engineering and Biotechnology

№	Question	2014-2015	2015-2016	2016-2017	2017-2018	Overall
1	Please rate, organization and punctuality of the teacher	4,51	4,51	4,56	4,58	**4,54**
2	Rate how generally the training course was interesting and useful for you.	4,31	4,33	4,52	4,54	**4,43**
3	How well did you understand the goals and objectives, the content of the training course?	4,45	4,45	4,49	4,51	**4,49**
4	Does the teacher use new and useful materials to conduct classes?	4,42	4,47	4,45	4,54	**4,47**
5	In your opinion, to what extent does the content of the course read reflect the modern achievements of science and technology in this field?	4,47	4,46	4,49	4,5	**4,48**
6	In your opinion, the teacher is professionally competent and competent in the presentation of educational material.	4,44	4,48	4,47	4,52	**4,48**
7	In your opinion, how much is the erudition and culture of speech (the teacher's speech is professional, expressive, understandable, allows you to make the necessary entries)	4,39	4,48	4,47	4,51	**4,46**
8	Is the teacher available to present the course	4,4	4,4	4,46	4,53	**4,45**
9	Do you think there is a connection with practical activities, the teacher orients students to the profession?	4,43	4,39	4,46	4,5	**4,45**
10	Does the teacher encourage students to use various sources of information: additional literature, the Internet	4,4	4,41	4,47	4,51	**4,45**
11	Is the teacher objectively evaluating students' knowledge?	4,28	4,38	4,42	4,46	**4,395**
12	Does the teacher in the classroom maintain an atmosphere of mutual respect and understanding?	4,23	4,29	4,4	4,46	**4,35**
13	Does the course in general meet your requirements and expectations?	4,24	4,34	4,39	4,4	**4,34**
14	Will the material studied be useful in your future work or study?	4,36	4,3	4,42	4,47	**4,39**
Average score		4,39	4,41	4,49	4,47	**4,44**

Annex 7. The results of the survey "Student satisfaction with the quality of the organization of the educational process"

Do you combine work with study?

Educational program	Yes	No	Total
Doctorate	35,3%	64,7%	100%

Is your job related to your specialty?

Educational program	Yes connected	Net connected	Total
Doctorate	86,7%	13,3%	100%

Are you satisfied with the quality of teaching faculty composition of SKSU?

Educational program	Satisfied	Partially satisfied	Dissatisfied	Difficult to answer	Total
Doctorate	52,9%	41,2%	5,9%	0,0%	100,0%

What are the main shortcomings in teaching quality you would like to point out?

Educational program	**Doctorate**
Weak knowledge of teachers	10,0%
Bias teachers in assessing students' knowledge	20,0%
Bad explanation of the main lecture material	0,0%
Bad diction	10,0%
Lesson absences on the part of the teacher - breakdowns	10,0%
Inability to work with the audience	0,0%
Lack of logic, "algorithm" classes	0,0%
No handouts	20,0%
Monotony training sessions	30,0%
Total	100,0%

In what form are mainly conducted lectures on the disciplines of specialization?

Methods	Doctorate
Business game	5,7%
Role-playing game	0,0%
Organizational activity game	3,8%
Conversation	5,7%
Discussion	5,7%
Brainstorm	11,3%
Briefing	1,9%
Training	5,7%
Project Method	9,4%

Lecture at the same time two lecturers	5,7%
Analysis of situations of professional activity	9,4%
Using powerpoint	15,1%
Using the Internet	11,3%
Using CD-ROM, video and audio	9,4%

Do you often visit the SRSP, SRMP, SRDP?

Faculties	Constantly	If you have questions?	Only for CPC delivery	Never	Total
HIGH SCHOOL "CHEMICAL ENGINEERING AND BIOTECHNOLOGY	52,8%	18,0%	28,6%	0,6%	100,0%

How are the themes and forms of the CDS related to the specialty?

Faculties	Fully	Partially	Does not match	Total
HIGH SCHOOL "CHEMICAL ENGINEERING AND BIOTECHNOLOGY"	61,9%	35,0%	3,1%	100,0%

В какой форме в основном проводятсясеминарские занятия по дисциплинам специализации?

Methods	Doctorate
Business game	5,3%
Role-playing game	1,8%
Organizational activity game	5,3%
Conversation	8,8%
Discussion	10,5%
Brainstorm	1,8%
Briefing	3,5%
Training	5,3%
Project Method	10,5%
Lecture at the same time two lecturers	3,5%
Analysis of situations of professional activity	15,8%
Using powerpoint	10,5%
Using the Internet	7,0%
Using CD-ROM, video and audio	10,5%
Total	100,0%

How are the tasks of the CDS aimed at developing your competencies as a future specialist?

Faculties	Fully	Partially	Does not match	Total
HIGH SCHOOL "CHEMICAL ENGINEERING AND BIOTECHNOLOGY"	49,1%	45,6%	5,3%	100,0%

Rate on a five-point scale (1-minimum grade; 5-maximum) the following indicators of the quality of educational services of the university

Questions	Rating Scale					
Conditions of education	1	2	3	4	5	Total
State of the classroom fund	3,6%	5,4%	17,5%	37,6%	35,8%	100,0%
Provision of classes with laboratory equipment, visual materials, etc.	4,6%	5,2%	17,0%	40,3%	32,9%	100,0%
Technical support of the educational process with technical training aids, including computer, media technologies, interactive whiteboards, etc.	4,1%	6,3%	17,7%	35,6%	36,3%	100,0%
The quality of the educational program and its implementation						
The content of educational programs (clarity of the goals and objectives of the course; communication of the content of educational programs with the goals and objectives of the course; the present level of information, its sufficiency for practical use; the development of skills and practical skills).	3,3%	4,1%	16,7%	37,8%	38,1%	100,0%
Training methods and organization of the educational process (accessibility, quality and timeliness of teaching educational material; knowledge assessment methods; convenience and adherence to the class schedule; compliance of the actual educational process with the expectations of university advertising; provision and organization of independent training).	2,2%	5,8%	16,0%	36,6%	39,4%	100,0%
Relations with the faculty (partnership, culture of communication, accessibility, objectivity, level of mutual understanding).	2,0%	5,2%	14,5%	34,1%	44,2%	100,0%
Relationships with the administration and staff of the university (efficiency and quality of issues, culture of communication).	3,3%	6,5%	16,9%	34,5%	38,8%	100,0%
Material and technical equipment of the educational process (audience; laboratories; base for practices; computers and software, etc.).	3,7%	5,0%	17,3%	35,5%	38,6%	100,0%

The level of information services (sufficiency and quality of library and methodological support; availability and informativeness of computer networks of the university; organizational information at the faculty (department)).	2,8%	5,3%	16,1%	34,4%	41,3%	100,0%
Involvement in university processes (the level of student self-government; consideration and implementation of students' wishes).	3,5%	6,3%	17,0%	35,0%	38,3%	100,0%
The level of social security (housing and medical care, catering, leisure activities).	4,8%	5,1%	17,4%	35,7%	37,1%	100,0%
The possibility of obtaining additional educational services and participation in research activities.	3,1%	5,4%	15,9%	36,0%	39,6%	100,0%
Satisfaction in the chosen specialty and interest in the future profession.	2,9%	5,1%	12,9%	33,1%	46,0%	100,0%
The quality of the organization of independent work of students under the guidance of a teacher (IWST)	2,2%	3,7%	14,3%	35,7%	44,1%	100,0%
Quality organization of professional practice	2,9%	4,3%	16,2%	35,7%	40,9%	100,0%
Timetable of classes	3,0%	3,8%	11,1%	34,4%	47,6%	100,0%
Quality learning outcomes						
The level of theoretical knowledge you receive	2,2%	3,1%	14,6%	38,1%	42,1%	100,0%
Level purchased by you professional skills and skills	2,3%	4,3%	14,9%	36,4%	42,1%	100,0%
Compliance with the level of training in general, modern requirements for the profession	2,3%	5,8%	16,2%	36,8%	38,9%	100,0%
Additional services						
Student trade union.	3,2%	5,1%	16,1%	37,6%	38,1%	100,0%
Psychologist	4,0%	6,8%	16,4%	35,0%	37,8%	100,0%
The work of student clubs and student government	4,9%	4,8%	15,3%	36,8%	38,1%	100,0%

The work of the sports sector	5,1%	6,3%	14,8%	35,4%	38,3%	100,0%

How often do you work in the library?

Options	Answers					Total
	5 and more times a week	2-4 times a week	Lessthan1 time a week	2-3 times a mounth	Do not use	
I work and prepare in the library	17,4%	34,5%	26,0%	17,1%	5,0%	100,0%
I work and prepare at the university's electronic resource center.	17,4%	36,5%	25,0%	17,1%	4,0%	100,0%
I use the computer classes of the university for self-study.	20,7%	34,4%	22,0%	16,9%	6,0%	100,0%

How much is the service level of the university library staff? Is it meet your expectations?

Educational program	Fully	Partially	Does not match	Total
Doctorate	64,7%	23,5%	11,8%	100,0%

How effective and accessible is the work of university students with the Internet?

Educational program	Great, you can always work with the Internet.	It is not always possible to work due to the large number of willing students, that is, there are not enough Internet classes	I rarely can work because of lack of time - this is not taken into account when organizing the work of Internet classes	Do not use	Total
Докторантура	58,8%	26,8%	5,9%	8,5%	100,0%

Do you think are there at SKSU?

Options	Fully	Partially	Absent	Difficult to answer	Total
Good training conditions	49,7%	40,7%	4,3%	5,3%	100,0%
Good conditions for independent work	43,8%	43,5%	7,0%	5,7%	100,0%

Good conditions for physical education and sports	48,5%	34,8%	9,5%	7,2%	100,0%
Good leisure facilities	33,9%	38,7%	17,5%	9,9%	100,0%
Artistic opportunities	37,5%	43,7%	7,0%	11,8%	100,0%
Opportunities for doing science	40,6%	43,1%	6,4%	9,9%	100,0%

How effective and accessible is the work of university students with the Internet?

Posts	Doctorate
Faculty / High School Administration	17,8%
Head of Department	24,4%
To teachers	31,1%
To the curator of the group	8,9%
To student council	2,2%
Group Warden	2,2%
To parents, relatives	4,4%
To friends, classmates	8,9%
Total	100,0%

Satisfaction of students with research work
Level of research organization of

Educational program	High	Low	Can not answer	Total
Doctorate	94,1%	5,9%	0,0%	100,0%

Attracting students to research?

Educational program	Department teachers	Dean's office	Tutors / curators	Total
Doctorate	100%	0,0%	0,0%	100,0%

Accessibility of scientific leaders

Educational program	Yes, according to the schedule you can get a consultation.	Meetings are held, but consultation is not possible	Can not answer	Total
Doctorate	88,2%	5,9%	5,9%	100,0%

Annex 8. The results of the survey «Satisfaction of teaching staff with university»

Graduate School of Chemical Engineering and Biotechnology

№	Questions	Answers		
		Yes	Not	Sometimes
1	Do you think the university adequately evaluates your contribution to raising the image of the university?	85,1%	5,5%	9,4%
2	Are you satisfied with the social support of teachers by the leadership of the university?	64,7%	17,6%	17,6%
3	Is there a notion of "team", "corporate spirit" in the university staff?	79,9%	7,6%	12,5%
4	Satisfaction of the faculty with the support of the university in research work	43,4%	22,6%	34,0%
5	Are you satisfied with the results of independent work of students with teachers (IWST)?	78,5%	8,4%	13,1%

Annex 9. The results of the survey "«Employer satisfaction with the quality of graduates training»

Evaluation of enterprises / institutions of the image of M. Auezov SKSU

The scope of enterprises / institutions	1	2	3	4	5	Общий
Technical sciences and technology	0,0%	0,0%	0,0%	50,0%	50,0%	100,0%

Salaries offered to graduates?

The scope of enterprises / institutions	20-40 thousand tenge.	40-60 thousand tenge.	60-80 thousand tenge.	80-100 thousand tenge.	100-120 thousand tenge.	Above 120 thousand tenge.	Overall
Technical sciences and technology	0,0%	23,5%	23,5%	35,3%	5,9%	11,8%	100,0%

Staffing of enterprises / institutions

The scope of enterprises / institutions	The bad	Satisfactory	Well	Very good	Overall
Технические науки и технологии	0,0%	35,3%	52,9%	11,8%	100,0%

Methods used by the enterprise / institution for employment

The scope of enterprises / institutions	Recruitment immediately after graduation	Through media advertising	By posting information on the institution's website	Through employment agencies	According to colleagues	Overall
Technical sciences and technology	40,0%	6,7%	6,7%	26,7%	20,0%	100,0%

Развитие предприятия / учреждения впоследующие 5 лет

The scope of enterprises / institutions	The scope of work decreases	Without changes	Average job growth	Significant increase in the scope of work	Overall
Technical sciences and technology	0,0%	11,8%	29,4%	58,8%	100,0%

Ways of advanced training graduates

The scope of enterprises / institutions	Close cooperation between university and enterprise	The University provides an opportunity for the staff of an enterprise and institution to teach practice-oriented courses.	Conducting classes using the capabilities and resources of production bases	In-depth study of new specialized specialized programs	Overall
Technical sciences and technology	40,0%	26,7%	13,3%	20,0%	100,0%

Employer satisfaction with the quality of graduates' knowledge (1 - low, 5 - high)

The scope of enterprises / institutions	1	2	3	4	5	Overall
Technical sciences and technology	0,0%	0,0%	7,7%	38,5%	53,8%	100,0%

Level of knowledge of graduates' labor law (1 - low, 5 - high)

The scope of enterprises / institutions	1	2	3	4	5	Overall
Technical sciences and technology	0,0%	0,0%	7,7%	38,5%	53,8%	100,0%

The quality of our graduates compared to other graduates in the region (1 - low, 5 - high)

The scope of enterprises / institutions	1	2	3	4	5	Overall
Technical sciences and technology	0,0%	0,0%	0,0%	46,2%	53,8%	100,0%

Annex 10.Scientific schools and research on the profile of the educational program

№	Name of research topics and projects	Performers (department, name of participants)	Terms of implementation	Sources of financing, the amount of the deal
Grant projects				
1.	The use of aluminosilicate sorbents for the extraction of phosphorus from phosphorus-containing sludge	Leader - Doctor of Technical Sciences, Professor Tleuov A.S. Performers - associate professor Tleuova S.T., doctoral student - Arystanova S.	2015 – 2016	MES RK, 5 million tenge
2.	Investigation of changes in the content of sanitary-epidemiological, toxicological and radiological compounds in tomatoes, carrots, maize and soya bean crops when using humate-containing complex-mixed NPK-fertilizers of prolonged action, to ensure environmental safety	Leader - Doctor of Technical Sciences, Professor Zhantasov K.T. Performers - Associate Professor Kadirbaeva AA, Professor Dzhanmuldaeva Zh.K., doctoral students Shalataev S., Nalibayev M.	2015 – 2016	MES RK, 9,5 million tenge
3.	Improving the technology of cleaning gases from aerosols	Leader -Doctor of Technical Sciences, Eskendirov M.Z. Performers - Senior Lecturer Eskendirova M.M.	2015 – 2017	MES RK, 5 million tenge
4.	Investigation of the state of nitrocellulose powders released from recyclable ammunition in order to use them in the production of more environmentally friendly and safe to use industrial explosives.	Leader - associate professor Ospanov S.S.	2015 – 2017	MES RK, 6,5 million tenge
5.	Hybrid technology of integrated gas cleaning.	Leader -Doctor of Technical SciencesEskendirov M.Z. Artists - Senior Lecturer Eskendirova MM, associate professor Koshkarbaeva Sh. T., doctoral student	2018-2020	MES RK, 8 million tenge

		Tileuov G.		
6.	Development of scientific bases for obtaining pure lithium salts and rare earth elements from hydromineral raw materials	Leader - Doctor of Technical Sciences, professor Anarbaev A.A.	2018-2020	MES RK, 7 million tenge
Contractual projects				
1.	Development of technology for the utilization of distiller fluid using natural sodium sulfate of the Aral region	Leader - dts, prof. Anarbaev A.A. Performers- prof. Seitmagzimova G.M., prof. Eskendirov M.Z.	2017-2018	Center of salt technologies JSC, Astana, 15 million tenge
2.	Establishment of new opportunities for increasing agrochemical value, improving the physicochemical and consumer properties of ammonium nitrate	Leader: Doctor of Technical Sciences, Professor U. Besterekov Performers - Associate Professor Bolysbek AA, Kambarova G.A., doctoral students Ermekov S., Kydyralieva A.	2017-2019	LLP "KazAzot", Aktau, 12 million 730 thousand tenge

Annex 11. Teaching staff summary

Galina Manuilivna Seitmagzimova *E-mail: galinaseit@mail.ru*	
Education:	
1985	Leningrad Lensoviet Institute of Technology, Leningrad, Russian Federation. Graduation (Technology of Inorganic Substances)
1989	Leningrad Lensoviet Institute of Technology, Leningrad, Russian Federation. Candidate (PhD) thesis defense (Technology of Inorganic Substances)
Work experience:	
Academic:	
Work in this organization	
1994-2018	M. Auezov South Kazakhstan State University. Senior lecturer, associate professor, head of "Chemical Technology of Inorganic Substances" department
Discipline	Research Methodology, Doctoral Student Scientific Advisory
	Employment- fulltime
Non-academic:	
1989-1994	Joint-Stock Company «Phosphorus», Shymkent
	Engineer
	Employment- fulltime
Professional development:	
2016 2017	Scientific internship: -Technical University of Munchen (Germany) -Polytechnical University of Valency (Spain)

Membership in professional organizations:	
2012-2015 2016- 2018	European Chemistry Thematic Network ECTN. International educational project «European Chemistry and Chemical Engineering Education Network» (EC2E2N2) M. AuezovSouthKazakhstanStateUniversity,memberofRepublicaneducational-methodical council of the Ministry of Education and Science of the Republic of Kazakhstan
Awards and prizes:	
2006	The best university teacher
2018	Breastplate «Honorary Worker in Education»of Ministry of Education and Science of RK
Service activities:	
2017	«Development of technology of distiller waste utilization using natural sodium sulfate of the Aral sea region». Contractual work with the Salt Technology Center» (Astana)- 2017. (15 mln. tenge)
Publications and presentations:	
For the last 5 years	Total number–more then 160 1) A.Seitmagzimov, V.Bishimbayev, G. Seitmagzimova. Influenceof surface morphologyandtitaniumoxidefilmthicknessonits photo-electrochemical properties. - Asian Journal of Chemistry, Vol. 25, No. 6 (2013), 3285-3288, Sahibabad-201 005(Ghaziabad) INDIA. (Scopus) 2) A. Seitmagzimov, G. Seitmagzimova.Modification of Titanium Oxide Films by Ferric Ions in Hydrothermal Conditions and their Photo-Electrochemical Properties. - Asian Journal of Chemistry, Vol. 27, No. 4 (2015), 1521-1524, Sahibabad-201 005(Ghaziabad) INDIA. (Scopus) 3) A. Seitmagzimov, B. Sarsenbayev, G. Seitmagzimova, Zh. Aimenov, A. Kurtayev, K. Abdiramanova. Geopolymeric cements based on South-Kazakhstan clay loam produced by non-clinker and non-fired scheme. - The 15th Asian Regional Conference on Soil Mechanics and Geotechnical Engineering, 9-13 November, 2015, Fukuoka, Japan.- p. 167.(Scopus, Thomson Reuters). 4) Lang H., Seitmagzimova G., AstafievaE.EinUniversitatimAufbruch. - Nachrichtenaus der Chemie. – April 2017,Vol.65,No4. (Scopus)
New scientific developments:	
2016-2019	Participation in International educational projectErasmus+ “Promotinginternationalizationofresearchthroughestablishmentof Cycle 3QASystem in line with the European Agenda”
Additional information:	
2016	Patents and copyrights: A. Seitmagzimov, G. Seitmagzimova, M. Satayev, Yu. Sevastyanova, A. Saipov. Patent «The method of producing cellulose» № 31671.

Tleuova Saltanat Talipovna*E-mail:saltanat.talipovna52@mail.ru*	
Education:	
1975	Kazakh of Chemical Technology Institute, Shymkent. Graduation (Binding Technology)
1988	Leningrad Lensoviet Institute of Technology, St. Petersburg, Russian

	Federation. Candidate thesis defense (Technology of silicate, refractory non-metallic materials)
Work experience:	
Academic:	
Work in this organization	
1977-2018	M. Auezov South Kazakhstan State University.Engineer, junior researcher, senior scientist, seniorlecturer, associate professor of the department "Chemical technology of inorganic substances"
Discipline	Innovative technologies of inorganic substances, Scientific advising doctoral student
	Employment- fulltime
Professional development:	
For the last 5 years	1) "Development of technologies for the production of high-quality agglomerates from waste from the phosphoric and metallurgical industries with the production of doped ferrophosphorus using Co, Ni and Mn" ("Kazphosphate" LLP, Taraz) 2) "Development of physicochemical and technological bases for obtaining phosphate agglomerates using oil waste" (Petro Kazakhstan Oil Products LLP, Shymkent), 3) "Study of the physicochemical laws of the agglomeration of manganese-containing raw materials using oil-bitumen and schungite rocks" (LLP Ferroalloy Plant, Taraz) Amount of financing –3.5 million tenge
Membership in professional organizations:	
2002 - 2018	M. AuezovSouthKazakhstanStateUniversity,memberofRepublicaneducational-methodical council of the Ministry of Education and Science of the Republic of Kazakhstan
Awards and prizes:	
2013	The best university teacher
2013	Breastplate "Honorary Worker of Education of the Republic of Kazakhstan"
Publications and presentations:	
For the last 5 years	Over 250 publications 1) Tleuov A.S., Kulahmet A.M., Tleuova S.T. et al. Investigations of the process of complex acid-thermal processing of phosphate production wastes. // News of NAS RK. - №1 (421). - 2017. - p. 241-244 2) Tleuova S.T., Baymakhanova A.K., Isaeva D.A., Altybaev Z.M., Arystanova S.D. Studies of the thermodynamic laws of sorption of phosphorus-containing wastes using vermiculite // KBTU Bulletin 2.3 April-September 2016, - 97-102c. 3) Tleuova S.T., Tleuov A.S., Altybaev Zh.M., Iskakova S.K., Beisenbayev O.K., Nazarbek U. Joint Aggiomeration of Phosphate Fines and Manganese Ore with Coal Mining Waste . // Oriental journal of chemistry 2016, Vol.32, No. (2) 4) Tleuova S.T., Tleuov A.S.et.al. Studies of acid activation and thermodynamic characteristics of aluminosilicates in sorption process of phosphorus release from sludge.//Oriental journal of chemistry 2017,Vol.32, No. (5) - 2577-2584p.
New scientific developments:	
For the last 5	1) "The use of aluminosilicate sorbents for the extraction of phosphorus from

years	phosphorus-containing sludge". 2) "The study of thermodynamic and kinetic regularities of the chloride sublimation of Zn, Pb, and Cu from oxide-sulfide systems using a new type of chlorine-chlorohydrocarbons". Amount of financing –5 million tenge 1) "The use of aluminosilicate sorbents for the extraction of phosphorus from phosphorus-containing sludge". 2) "The study of thermodynamic and kinetic regularities of the chloride sublimation of Zn, Pb, and Cu from oxide-sulfide systems using a new type of chlorine-chlorohydrocarbons". Amount of financing –5 million tenge
Additional information:	
2016 2017	Patents and copyrights: 1) TleuovA.S., Tleuova S.T., Nazarbekova S.P., Nazarbek U.B. Resource-saving technologies for processing industrial waste. Certificate of state registration of rights to the object of copyright No. 1191. 2) Sataev M.I., Tleuova S.T., Altybaev Zh.M., Arystanova S.D., Isaeva D.A. A method of obtaining a sorbent for the extraction of phosphorus from phosphorus-containing sludge. Utility model, bull. №11.

Besterekov Uilesbek Besterekovich*E-mail: besterek_80@mail.ru*	
Education:	
1969	Kazakh of Chemical Technology Institute. Graduation (Technology of inorganic substances)
1978	Moscow of Chemical Technology Institute D.I. Mendeleev.Candidate thesis defense(Processes and apparatuses of chemical technology)
2006	M. AuezovSouthKazakhstanStateUniversity.Doctoral thesis defense (Geoecology)
Work experience:	
Academic:	
Work in this organization	
1978-2018	M. AuezovSouthKazakhstanStateUniversity. Seniorlecturer, associate professor, SNS, head of the department, professor of the department "Chemical technology of inorganic substances"
Discipline	Technology of nitric acid processing of phosphate raw materials, Scientific advising doctoral student
	Employment- fulltime
Non-academic:	
1969-1973	"Phosphorus" PPE, Shymkent
	Rapporteur, master, shift manager
	Employment- fulltime
Professional development:	
2016	Russian of Chemical Technology University D. Mendeleev, Moscow, Russian Federation
Membership in professional organizations:	
2013-2016	H. Dulati Taraz State University, Chairman of the State Certification Commission for the specialty "Chemical technology of inorganic substances"
Awards and prizes:	

2018	Badge of the MES RK "Y. Altynsarin"
2014	The best university teacher
2014	Medal of the Russian Academy of Natural Sciences "Dmitry Mendeleev"
2008	A badge of the MES RK "For merits in the development of science of RK"
2006	Badge of the MES RK "Honorary Worker of Education"
Service activities:	
2017-2019	Head of economic contracts with KazAzot JSC on the topic “Establishing new opportunities for increasing agrochemical value, improving physicochemical and consumer properties of ammonium nitrate”. Financing amount - 12.73 million tenge
Publications and presentations:	
For the last 5 years	Total number - more than 200 1) Results of physico-chemical studies of coal mining waste at the Lenger deposit // Journal "Chemical Journal of Kazakhstan", No. 4, 2015, Almaty, - P. 95-101 2) Graphical analysis of the process of obtaining monocalcium phosphate from substandard technogenic phosphate raw materials on the phase diagrams of the systems CaO - P2O5-SO3-H2O and CaO-P2O¬5-H2O // KazNTU Bulletin 2016, №6. - p. 479-482. 3) The results of the study of the technology of encapsulation of the complex organic-mineral fertilizer of the quality of simple superphosphate based on man-made waste of phosphorus production // Bulletin of KazNRTU, №1 2017.- C 518-521 4) Development of technology for producing granulated sodium tripolyphosphate // Bulletin of KazNTU №1 2017.- P. 522-524 5) The basics of technology and thermodynamic analysis of the process of acid decomposition of phosphorus sludge // Bulletin of KazNRTU №2 2017. - p. 579-586
New scientific developments:	
2013-2016 2015–2020	1) Head of the international grant of the NATO Science Committee for the Science for Peace and Security Program "Assessment of Transboundary Water Pollution in Central Asia" 2) Head of the project on the development of new technologies for the production of complex fertilizers based on waste from phosphate production and coal mining, the determination of the physicochemical properties of water-salt mixtures on the specific energy indicators of ions.
Additional information:	
 2015 2015 2018 2018	Patents and copyrights: 1) Certificate of state registration of rights to the object of copyright No. 1537 - electronic educational publication "Test collection for the discipline" Chemical technology of inorganic acids, bases and salts "; 2) Certificate of state registration of rights to the object of copyright No. 912 - electronic textbook "Theoretical foundations of the technology of inorganic substances"; 3) Certificate of state registration of rights to the object of copyright No. 01444 - textbook "soda nitrogen nitrogen sysylstar indiristerinin tekhnologlyқ negizderi men eseptuleri"; 4) Certificate of state registration of rights to the object of copyright No. 0160 - training manual "Chemistry and technology of inorganic substances."

Tleuov Alibek Spabekovich*E-mail:saltanat.talipovna52@mail.ru*	
Education:	
1974	Kazakh of Chemical Technology Institute. Graduation (Technology electrothermal production)
1984	Leningrad Lensoviet Institute of Technology, St. Petersburg. Candidate thesis defense(Technology of inorganic substances)
2008	M. AuezovSouthKazakhstanStateUniversity.Doctoral thesis defense(Technology of inorganic substances)
Work experience:	
Academic:	
Work in this organization	
1986 - 2018	M. AuezovSouthKazakhstanStateUniversity. Seniorlecturer, dean, associate professor, head of the department of Chemistry, professor of the department of "Chemical technology of inorganic substances"
Discipline	Management of scientific projects for the production of inorganic compounds, Scientific advising doctoral student
	Employment- fulltime
Previous jobs in educational institutions:	
1975-1977	Kazakh of Chemical Technology Institute. Senior engineer, MNF
Discipline	Processes and devices of chemical technology
	Employment- fulltime
Non-academic:	
1974-1975	"Phosphorus" PHO
	Hardware operator
	Employment- fulltime
Professional development:	
For the last 5 years	1) “Development of a technology for the production of high-quality agglomerates from waste from the phosphoric and metallurgical industries with the production of doped ferrophosphorus containing Co, Ni and Mn” (Kazphosphate LLP, Taraz); 2) “Development of physicochemical and technological bases for obtaining phosphate agglomerates using oil waste” (Petro Kazakhstan Oil Products LLP, Shymkent); 3) "The study of the physicochemical laws of the agglomeration of manganese-containing raw materials using petroleum and schungite rocks" (LLP "Plant of Ferroalloys", Taraz). The amount of financing is 5 million tenge. (2013)
Membership in professional organizations:	
2012 - 2018	M. AuezovSouthKazakhstanStateUniversity, chairman of the dissertation council on specialties 6D072000 - Chemical technology of inorganic substances and 6D072100 - Chemical technology of organic substances
Awards and prizes:	
2018	Medal of the Ministry of Education and Science of the Republic of Kazakhstan "For merits in the development of science"
2008, 2018	The best university teacher
2009	Breastplate "Honorary Worker of Education of the Republic of Kazakhstan"
Publications and presentations:	
For the last 5 years	Total number - more than 250 1) Tleuov A.S. Agglomeration of manganese ores using carbonaceous waste. //

	Collection of works of the international practical conference "New technologies, inventions". Turkey, 2014. 2) Tleuov A.S., Tleuova S.T., Iskakova S.K., Altybayev Zh.M., Nazarbek U. «Joint Agglomeration of Phosphate Fines and Manganese Ore with Coal Mining Waste»// Oriental Journal of Chemistry, 2016. 3) Tleuov A.S., ArystanovaS.D.,Tleuova S.T. , Altybayev Zh.M.,Suigenbayeva A.Zh. Studies of acid activation and thermodynamic characteristics of aluminosilicates in sorption process of phosphorus release from sludge», //Oriental Journal of Chemistry , 2016. 4) Tleuov A.S., Arystanova S.D., Altybayev Zh.M.,Shapalov S.K. Possibilities to use vermiculites for sorption cleaning of phosphorus-containing sludge. //News of the National Academy of Sciences of the Republic of Kazakhstan Series of Geology and Technical Sciences , 2017.
New scientific developments:	
For the last 5 years	The head of research work on topics: 1) "Development of physico-chemical and technological bases for obtaining phosphate agglomerates using oil waste." The amount of financing is 5 million tenge; 2) "The study of the physico-chemical laws of the agglomeration of manganese-containing raw materials using petroleum and schungite rocks." The amount of funding is 5 million tenge; 3) "The study of non-coking coal and their waste in the production of ferroalloys." The amount of funding -3 million tenge
Additional information:	
2014	Patents and copyrights: 1) Innovative patent of the Republic of Kazakhstan No. 29153. "The mixture for the production of manganese sinter".

Yeskendirov Marat Zakhanovich *E-mail:* *mares@inbox.ru*	
Education:	
1983	Moscow of Chemical Technology Institute DI. Mendeleev. Graduation (Basic processes of chemical production and chemical cybernetics)
1991	Kazakh of Chemical Technology Institute. Candidate thesis defense(Processes and apparatuses of chemical technology)
2005	M. AuezovSouthKazakhstanStateUniversity. Doctoral thesis defense(Processes and apparatuses of chemical technology)
Work experience:	
Academic:	
Work in this organization	
2015-2018	M. AuezovSouthKazakhstanStateUniversity.Professor of the department "Chemical technology of inorganic substances"
Discipline	Scientific advising doctoral student
	Employment- parttime
Previousjobsineducationalinstitutions:	
2009-2015 2008-2009 2005-2008	M. AuezovSouthKazakhstanStateUniversity: - Professor of the department "Technological processes and devices; - Professor of the department "Ecology"; - Associate professor of the department "Technique of Oil and Gas Complex"
	Processes and devices of chemical technology
	Employment- fulltime

Professional development:	
2018	M.Kh. Dulati Taraz State University
Awards and prizes:	
2018	A badge of the MES RK "For merits in the development of science"
2016	Diploma of Maslikhat of the SKR "For achievements in science and education"
Service activities:	
Period:	(Within and outside the institution)
Publications and presentations:	
For the last 5 years	Total number - more than 110 1) Eskendirov M.Z. Fractional redistribution of aerosol in the vortex wake behind the body of flow // Bulletin of the National Academy of Sciences of Kazakhstan. - 2004, №1. - P.118-120. 2) Shakirova A., Eskendirov M., Syrmanova K., Shakirov B. Dissipative Approach to the Calculation of the Diffusion Coefficient of the Aerosol in Turbulent Flows//Chemical Engineering Transactions. – 2014. - Vol. 39, - P. 1213 – 1218. (база данных Scopus) 3) Yeskendirov M., Shakirova A., Kenig E., Yeskendirova M., Sadyrbayeva A. Aerosol Par-ticles' Catching Efficiency in Regular-packed Gas-liquid Apparatuses//Industrial Technology and Engineering. – Shymkent, 2015. - Vol. 3(16) – P.22-35.
New scientific developments:	
For the last 5 years	1) Head of research on the topic: "Improving the technology of cleaning gases from aerosols", under the grant of the MES RK (2015-2017). Financing volume - 5 million tenge 2) Head of research on the topic: "Hybrid technology of integrated gas cleaning", under the grant of the Ministry of Education and Science of the Republic of Kazakhstan (2018-2020). Amount of financing - 8 million tenge
Additional information:	
2017	Patents and copyrights: 1) Volnenko A.A., Bishimbayev V.K., Eskendirov M.Z., Protopopov A.V., Zhantasov K.T., Anarbaev A.A. The device with a nozzle for heat exchange and dust collection. Patent of the Republic of Kazakhstan No. 2092 for a utility model, 08/25/2016, 03/30/2017., Byul. №6.

Dzhanmuldaeva Zhanyl Kemaladinovna*E-mail: zhanyld@mail.ru*	
Education:	
1987	Kazakh of Chemical Technology Institute, Shymkent. Graduation (Chemical technology of inorganic substances)
1992	Kazakh of Chemical Technology Institute, Shymkent. Candidate thesis defense (Technology of inorganic substances)
Work experience:	
Academic:	
Work in this organization	
1991-2018	M. AuezovSouthKazakhstanStateUniversity. Research associate teacher, seniorlecturer, associate professor, professor of the department "Chemical technology of inorganic substances"
Discipline	Optimization of chemical and technological processes
	Employment- fulltime

Non-academic:	
1990	JSC "Phosphorus", Shymkent
Период:	Engineer
	Employment- fulltime
Professional development:	
2016	Scientific internship in the Czech Republic, Prague, University of Chemistry and Technology in Prague
Membership in professional organizations:	
2016-2018	M. AuezovSouthKazakhstanStateUniversity,memberofRepublicaneducational-methodical council of the Ministry of Education and Science of the Republic of Kazakhstan
Publications and presentations:	
For the last 5 years	The total number is more than 180: 1) Dzhanmuldaeva Zh.K.,Seitmagzimova G.M., Dzhanmuldaeva A.K.«Advanced metod of processing of LOW-grade raw materials» //Журнал Industrial Technology and Engineering. 2014, 2(11): 44-49. 2) Dzhanmuldaeva Zh.K., Seytmagzimova G.M., Dzhanmuldaeva Z.K., Kaipova Z.N. Disposal of delignification extract using organic-mineral fertilizer. // Collection of works of the Republican Scientific and Technical Conference "Actual problems of chemistry and technology of cellulose and its derivatives." - Tashkent, 2018. - P.208-209. 3) Dzhanmuldaeva Zh.K., Dzhanmuldaeva AK Development of technology for processing technogenic waste from the phosphorus industry. - Eurasian Union of Scientists (ESU) .- Moscow: №5 (50), part 1, 2018. - P.23-26.
New scientific developments:	
For the last 5 years	1) The contractor of the project “Research on the change in the content of sanitary-epidemiological, toxicological and radiological compounds in tomatoes, carrots, corn and soya-bean crops when using humate-containing complex-mixed NPK fertilizers of prolonged action, to ensure environmental safety”; (2015-2016). 2) Project implementer: “Hybrid technology of complex gas cleaning”, under the grant of the Ministry of Education and Science of the Republic of Kazakhstan (2018-2020). Amount of financing - 8 million tenge
Additional information:	
2018 2018	Patents and copyrights: 1) Certificate No. 1140 “Industrial Water Treatment (Teaching Aid)” - computer program; 2) Certificate number 1141 "Technology of the main production (teaching aid)" - a computer program.

Zhantasov Kurmanbek Tazhmakhanbetovich*E-mail:* *k_zhantasov@mail.ru*	
Education:	
1974	Kazakh of Chemical Technology Institute. Graduation (Technology electrothermal processes)
1986	LeningradLensovietInstituteofTechnology. Candidate thesis defense(Technology of inorganic substances)
1999	M. AuezovSouthKazakhstanStateUniversity. Doctoral thesis defense (Technology of inorganic substances)
Work experience:	

Academic:	
Work in this organization	
1993-2018	M. AuezovSouthKazakhstanStateUniversity. Seniorlecturer, associate professor, head of department, professor of the department "Chemical technology of inorganic substances"
Discipline	Modern technology is difficult - mixed fertilizers, Scientific advising doctoral student
	Employment- fulltime
Previous jobs in the organization of education:	
2009-2011	M. AuezovSouthKazakhstanStateUniversity.Head of the department "Life Safety and Environmental Protection"
	Life safety
	Employment- fulltime
Non-academic:	
1974-1993	"KazNIIGiprofosfor" LLP, Shymkent
	Head of Laboratories
	Employment- fulltime
Professional development:	
For the last 5 years	Russian of Chemical Technology University DI. Mendeleev, Moscow; St. Petersburg State Technological Institute (Technical University), St. Petersburg; Belarusian State Technological University, Minsk
Membership in professional organizations:	
2006-2018	M. AuezovSouthKazakhstanStateUniversity, member of the dissertation council for specialties 6D072000 - Chemical technology of inorganic substances and 6D072100 - Chemical technology of organic substances
Awards and prizes:	
2017	Breastplate "Bilim zhane gylym kasibodagyna sinirgen enbegi ushin"
2016	Badge "Ximiya onerkasibininuzdik kyzmetkeri"
2015	Breastplate "Honorary Worker of Education of the Republic of Kazakhstan"
2014	The best university teacher
2014	Medal «European scientific and industrial consortium – Dmitri Mendeleev»
2013	Honorary title of the Russian Academy of Natural Sciences "Honored Worker of Science and Education"
2008	The best university teacher
2006	Badge "For merits in the development of science of Kazakhstan"
2005	State Prize of the Republic of Kazakhstan in the field of science, technology and education
Publications and presentations:	
For the last 5 years	Total number - more than 350, including Scopus - more than 20 1) K.T. Zhantasov, M.Z. Iskandirov, K.D. Aybalaeva, and others. Modern technologies of mineral processing / Ed. Zhantasova K.T. –Shymkent: Ed. “Alem”, 2015. - 476s. 2) Bishimbayev, UK, Zhantasov, .T., Moldabekov, Sh.M., et al. Chemical technology of inorganic substances. Volume V, Mineral fertilizers and salts. SKSU, - Shymkent: “Alem” publishing house, 2015. - 484 p. 3) Bishimbayev, UK, Zhantasov, Қ.T., Moldabekov, Sh.M. prof. Zhantasova Қ.T. // Shymkent: Alem Publishing House Baspasy, 2016. 4) K. Zhantasov, K. Aibalaeva, M. Ismailov and others. Chemical processes of

	industrial production / textbook edited by D. Sc. prof. Zhantasova K.T. // Shymkent: publisher SKSU them. M. Auezov, 2016. - 484 p. 5) Physical chemistry of melts / textbook / K.T. Zhantasov, B.A. Lavrov, Yu.P. Udalov et al. - Almaty: Evero, 2016. - 248c.
New scientific developments:	
For the last 5 years	1) Project Manager "Creation of Technology and Development of Scientific Basis for the Synthesis of Multicomponent Mineral Fertilizers with Specific Features for Gray Soils" (2012-2014). The amount of funding is 90.390 million. tenge + 20% co-financing SKSU them. M. Auezov. 2) Project manager on the topic: "Study of changes in the content of sanitary-epidemiological, toxicological and radiological compounds in tomatoes, carrots, maize and soya bean crops when using humate-containing complex-mixed NPK — long-acting fertilizers, to ensure environmental safety" (2015 - 2017) The amount of funding is 27.77 million. tenge 3) AO NATD. Development of technology for producing carbon-containing chromate pellets. The amount of funding is 18.781 million tenge
Additional information:	
2017 2017 2017	More than 70 copyright certificates, patents and innovative patents, including: 1) Eurasian patent number 023417. The method of obtaining complex organic fertilizer; 2) Utility model No. 2101 "Method for producing carbonate sodium"; 3) Utility model No. 2092 "Apparatus with a nozzle for heat exchange and dust collection."

Koshkarbayeva Shaizada Tortaevna*E-mail:*[*shayzada_1968@mail.ru*](mailto:shayzada_1968@mail.ru)	
Education:	
1993	Kazakh of Chemical Technology Institute. Graduation (Technology of electrochemical production)
2002	M. Auezov South Kazakhstan State University.Candidate thesis defense (Technology of inorganic substances)
Work experience:	
Academic:	
Work in this organization	
2005-2018	M. Auezov South Kazakhstan State University. Senior lecturer, associate professor of the department "Chemical technology of inorganic substances"
Discipline	Management of scientific projects of electrochemical production,Scientific advising doctoral student
	Employment- fulltime
Предыдущие места работы в организациях образования:	
1996-2005	M. Auezov South Kazakhstan State University, lecturer of the department "Electrochemical technology"
Discipline	Theoretical bases of electrochemical technology
	Employment- fulltime
Professional development:	
2018	"Kainar" LLP, Shymkent
Membership in professional organizations:	
2016-2018	M. AuezovSouthKazakhstanStateUniversity,memberofRepublicaneducational-methodical council of the Ministry of Education and Science of the Republic of Kazakhstan

Awards and prizes:	
2018	The best university teacher
Publications and presentations:	
For the last 5 years	Total number - more than 120 1) Satayev M., Bolysbek A., Koshkarbayeva Sh., Abdurazova P., SarypbekovaN. A low-temperature gold coating of the dielectric surfaces employingphosphine gas as a reducing agent.// Web of Science (Thomson Reuters), Colloids and Surfaces A: Physicochemical and Engineering Aspects 2017. V.521, P.86-91. IF=2.714. 2) U.B.Nazarbek, Bolysbek A., Satayev M., Koshkarbayeva Sh.,Sarypbekova N., Abdurazova P. Preparation of photochemical coatings of metal films (cooper, silver and gold) on dielectric surfaces and studying their antimicrobial properties // Web of Science (Thomson Reuters), Colloids and Surfaces A: Physicochemical and Engineering Aspects 2017. V.532, P.63-69. 3) M.S Sataev,S. Perni, S.Z Nauryzova, Sh.Koshkarbayeva.A galvanic-chemical method for preparing diamond containing coatings // Colloids and Surfaces A: Physicochemical and Engineering Aspects.480(2015)p.384-389 IF=2.752. 4) M.S. Sataev, Koshkarbayeva Sh. A.B. Tleuova, S. Perni, S.B. Aidarova,P. Prokopovich. Novel process for coating textile materials with silver to prepare antimicrobial fabrics*// Colloids and Surfaces A Physicochemical and Engineering Aspects. 412 (2014) p. 146-151*IF=2.108
New scientific developments:	
For the last 5 years	Executor in the project “Study of changes in the content of sanitary-epidemiological, toxicological and radiological compounds in tomatoes, carrots, corn and soya legumes when using humate-containing complex-mixed NPK-fertilizers of prolonged action to ensure environmental safety” (2015-2017). Financing volume –27.77 million tenge
Additional information:	
2015 2016 2016 2015	Patents and copyrights: 1) Innovative patent № 30669. Method of applying a metallic coating on the surface of dielectric powders; 2) Patent for utility model. No. 2367. Photochemical method of gilding dielectrics; 3) Certificate of state registration of rights to the object of copyright number 0085. Fundamentals of technology of new materials; 4) Certificate of state registration of rights to the object of copyright No. 2155. Theoretical foundations of electrochemistry.

Sataev Malik Syvambaevich*E-mail: malik_1943@mail.ru*	
Education:	
1965	Kazakh of Chemical Technology Institute. Graduation (Technology of electrochemical production)
1972	Moscow of Chemical Technology Institute D.I. Mendeleev. Candidate thesis defense (Technology of electrochemical production)
2003	M. AuezovSouthKazakhstanStateUniversity. Doctoral thesis defense (Technology of inorganic substances / Technology of electrochemical processes and protection against corrosion)
Work experience:	

Academic:	
Work in this organization	
1974-2018	M. AuezovSouthKazakhstanStateUniversity. Senior lecturer, associate professor, head of department, professor of the department "Chemical technology of inorganic substances"
Discipline	The latest advances in applied electrochemistry, New methods for producing composite coatings, Scientific advising a doctoral student
	Employment- fulltime
Non-academic:	
1973-1974	Irtysh Chemical Metallurgical Plant
	The electrolysis shop operator
	Employment- fulltime
Professional development:	
2018	Scientific internship in Minsk, Belarusian State Technological University
Membership in professional organizations:	
2012-2018	M. AuezovSouthKazakhstanStateUniversity, member of the dissertation council for specialties 6D072000 - Chemical technology of inorganic substances and 6D072100 - Chemical technology of organic substances
Awards and prizes:	
2017	The best university teacher
2018	Breastplate "Bilim beru isininkurmetti kyzmetkeri"
Publications and presentations:	
For the last 5 years	Total number - more than 170 1) Satayev M., Bolysbek A., Koshkarbayeva Sh., Abdurazova P., SarypbekovaN. A low-temperature gold coating of the dielectric surfaces employingphosphine gas as a reducing agent.// Web of Science (Thomson Reuters), Colloids and Surfaces A: Physicochemical and Engineering Aspects 2017. V.521, P.86-91. IF=2.714. 2) U.B.Nazarbek, Bolysbek A., Satayev M., Koshkarbayeva Sh.,Sarypbekova N., Abdurazova P. Preparation of photochemical coatings of metal films (cooper, silver and gold) on dielectric surfaces and studying their antimicrobial properties // Web of Science (Thomson Reuters), Colloids and Surfaces A: Physicochemical and Engineering Aspects 2017. V.532, P.63-69. 3) M.S Sataev,S. Perni, S.Z Nauryzova, Koshkarbayeva Sh.A galvanic-chemical method for preparing diamond containing coatings // Colloids and Surfaces A: Physicochemical and Engineering Aspects.480(2015)p.384-389 IF=2.752. 4) M.S. Sataev, Koshkarbayeva Sh. A.B. Tleuova, S. Perni, S.B. Aidarova,P. Prokopovich. Novel process for coating textile materials with silver to prepare antimicrobial fabrics*// Colloids and Surfaces A Physicochemical and Engineering Aspects. 412 (2014) p. 146-151* IF=2.108
New scientific developments:	
For the last 5 years	Executor in the project “Study of changes in the content of sanitary-epidemiological, toxicological and radiological compounds in tomatoes, carrots, corn and soya legumes when using humate-containing complex-mixed NPK-fertilizers of prolonged action to ensure environmental safety” (2015-2017). Financing volume - 27.77 million tenge
Additional information:	
	Patents and copyrights:

2015 2017	1) Sataev MS, Koshkarbayeva Sh. T., Kozhakulov NK, Tasboltaeva AB, Sataev M.I. "The method of applying a metallic coating on the surface of dielectric powders". Innovative patent number 30669; 2) Sataev M.S., Abdurazova P.A., Koshkarbaeva Sh.T., Prokopovich P., Perni S., Saipov A.A. "Photochemical method of gilding dielectrics". Patent for utility model number 2367.

Қadirbaeva Almagul Akkopeykyzy*E-mail: diac_2003@mail.ru*	
Education:	
2000	M. AuezovSouthKazakhstanStateUniversity. Graduation (Chemical technology of inorganic substances)
2007	M. AuezovSouthKazakhstanStateUniversity. Candidate thesis defense (Technology of inorganic substances)
Work experience:	
Academic:	
Work in this organization	
2006-2018	M. AuezovSouthKazakhstanStateUniversity. Senior lecturer, associate professor of the department "Chemical technology of inorganic substances"
	Scientific advising doctoral student
	Employment- fulltime
Professional development:	
2016 2017 25.07.2017- 7.08.2017г.	Scientific internship: - at the Technical University of Munich (Germany); - at the Catholic University of Leuven (Belgium). Advanced training in the production of “Kazphosphate” LLP
Membership in professional organizations:	
2012 – 2018 2013-2015, 2017-2019	M. AuezovSouthKazakhstanStateUniversity,memberofRepublicaneducational-methodical council of the Ministry of Education and Science of the Republic of Kazakhstan UMB (Norway), performer of the international educational project “Water Harmony”
Awards and prizes:	
2016	The best university teacher
Publications and presentations:	
For the last 5 years	The total number is over 70, of which the main ones are: 1) Қadirbaeva A.A., Dzhanmuldaeva Zh.K., Iskakova.T.M. Method of processing mirabilite for sodium sulfate. // Bulletin Pavlodar State University. - Pavlodar: Pavlodar State University named after S.Toraygyrov, № 1, 2018. - 80-85 b. 2) U.B.Nazarbek, A.A. Kadirbayeva, M.Zh.Aitureev, O.P.Bayisbai, L.Aikozova Development of the Composition and Method of Producing A Liquid Complex Fertilizers With A Stabilizing Additive// Oriental journal of chemistry, 2017, Vol. 33, No. (3): Pg.1347-1353, IF=0,221 3) Kadirbayeva A.A., Yeskendirova M. M.,Kaldybay G., Iskakova T. Development of technical table salt purification methods// Scientific Journalof the Modern Education & Research Institute,Brussels, Belgium,2017. - P.72-76.

	4) K.T.Zhantasov, S.Sh.Shalataev, A.A. Kadirbayeva,D.M. Zhantasova Glyphosate: Application And Production Ways// Oriental journal of chemistry, 2017, Vol. 33, No. (3): Pg. 1381-1386, IF=0,221
New scientific developments:	
2015-2019 2018-2020	Executor in the project “Water Harmony”, UMB (Norway). The researcher on the topic: “Hybrid technology of complex gas cleaning”, under the grant of the Ministry of Education and Science of the Republic of Kazakhstan (2018-2020). Amount of financing - 8 million tenge
Additional information:	
2017 2017	Patents and copyrights: 1) Certificate of state registration of rights to the object of copyright in the textbook “Innovative technologies of digestible phosphates and nitrates” No. 1320; 2) Certificate of state registration of rights to the object of copyright on the textbook "Technological calculations of the production of inorganic salts" № 2108

Nazarbek Ulzhalgas Bakytzyzy*E-mail: unazarbek@mail.ru*	
Education:	
2003	M. AuezovSouthKazakhstanStateUniversity. Graduation (Finance and Credit)
2013	Network University SKSU-RUDN. Training in a magistracy on a specialty "Management"
2016	M. AuezovSouthKazakhstanStateUniversity. Doctoral PhD, protection (Chemical technology of inorganic substances)
Work experience:	
Academic:	
Work in this organization	
2015-2018	M. AuezovSouthKazakhstanStateUniversity. Senior lecturer, associate professorof the department "Chemical technology of inorganic substances"
Discipline	Technology of nitric acid processing of phosphate raw materials,Scientific advising doctoral student
	Employment- parttime
Previous jobs in educational institutions:	
2008-2011	M. AuezovSouthKazakhstanStateUniversity.Senior lecturer of the department "Finance"
	Finance
	Employment- fulltime
Professional development:	
For the last 5 years	"Kazphosphate" LLP ZMU, NDFZ, "Kainar" LLP
Awards and prizes:	
2016	The best university teacher
Publications and presentations:	
For the last 5 years	The total number is over 70, of which the main ones are: 1) U.B.Nazarbek, A.A. Kadirbayeva, M.Zh.Aitureev, O.P.Bayisbai, L.Aikozova Development of the Composition and Method of Producing A Liquid Complex Fertilizers With A Stabilizing Additive// Oriental journal of chemistry, 2017, Vol. 33, No. (3): Pg.1347-1353, IF=0,221 2) Nazarbek U.B., Besterekov U., et al.Results of the research of encapsulation

	technologies of complex organomineral fertilizer of the quality of simple superphosphate based on anthropogenic waste of phosphorus production // Vestnik KazNITU, №1 2017.- P. 518-521 3) Abdurazova P.A., Nazarbek U.B.,Bolysbek A.A.,KenzhibayevaG.S. et.al.Preparationofphotochemicalcoatingsofmetalfilms (copper, silverandgold) jndielectricsurfacesandstudyingtheirantimicrobialproperties //ColloidsandSurfacesAPhysicochemicalandEngineeringAspects, T. 532,2017. -c.63-69.
New scientific developments:	
For the last 5 years	Development of technology for processing solid industrial wastes of phosphorus production (“Kainar” LLP)
Additional information:	
2015 2016 2017	Patents and copyrights: 1) Innovative patent №30349 "Method for obtaining phosphate fertilizer from industrial waste"; 2) Innovative patent №30950 "Method for producing complex fertilizer"; 3) Author's Certificate No. 95650 The utility model “Method for producing a complex compound of gadolinium with antitumor activity”.

FULL NAME: Abibulla Abildaevich Anarbayev*E-mail:abib_28@mail.ru*	
Education:	
1980	Kazakh Institute of Chemical Technology, Shymkent Graduation (Technology of Electrothermal Production)
1989	Kazakh Institute of Chemical Technology, Shymkent Candidate (PhD) thesis defense (Technology of non-ferrous and rare metals)
2003	M. Auezov South Kazakhstan State University, Shymkent Doctoral thesis defense (Technology of Inorganic Substances)
Work experience:	
Academic:	
Work in this organization	
1981-2018	M. Auezov South Kazakhstan State University.Engineer, junior researcher, senior lecturer, senior teacher, associate professor, professor “Chemical Technology of Inorganic Substances”department
Discipline	Doctoral Student Scientific Advisory
Period:	Employment (part time)
Professional development:	
over the past5 years	1) "Development of technology for the production of high-quality agglomerates from waste from the phosphoric and metallurgical industries to produce doped ferrophosphorus containing Co, Ni and Mn" (Kazphosphate LLP, Taraz) 2) "Development of technology for the utilization of distiller liquid using natural sodium sulfate of the Aral region" (PF NC Salt Technology, Astana)
Membership in professional organizations:	
2011 - 2015	M. AuezovSouthKazakhstanStateUniversity,Member of the Republican educational-methodical council of the Ministry of Education of the Republic of Kazakhstan
Awards and prizes:	

2005, 2013	The best university teacher
2006	Breastplate "For merits in the development of science of the Republic of Kazakhstan"
2012	Order «Kurmet»
Publications and presentations:	
over the past5 years	Totalnumber–morethen270 1.Anarbaev A.A., Spabekova R.S., Turebaev E.P., Anarbaev N.A. Гидроминералды шикізаттан литий тұздары мен сирек жер элементтерін алудың ғылыми негіздері. // Proceedings of the international scientific-practical conference "Auezov reading -16": "The fourth industrial revolution: New opportunities for the modernization of Kazakhstan in the field of science, education and culture." - Shymkent, 2018. - T. 6. - p. 36-39. 2. AnarbayevA.A., SpabekovaR., KabylbekovaB.N., AnarbaevN.A., TurebaevE.P. Studyintheprocessoflithiumchlorideextractionfromthebrine. Proceesing V International Conference «Industrial Technologies and Engineering», ICITE – 2018, Volume II, M.AuezovSouthKazakhstanStateUniversity, Shymkent, Kazakhstan.2018.- P.30-35. 3.AnarbayevA.A., SerzhanovG.M., NurashevaK.K., KapsalyamovB.A. Possibilitiesofcreationofsodaash product ion andproductsonitsbasisinKazakhstaninthe Frameworkoftheglobalproject «Onebelt, oneway»//Bulletin of the Academy of Engineering of the Republic of Kazakhstan. No. 4 (701) -P.95-104.
New scientific developments:	
2018-2020 2017-2018	1) Scientific project "Development of the scientific basis for obtaining pure lithium salts and rare-earth elements from hydromineral raw materials", MES RK, funding amount 7.0 million tenge 2) Contract-based research and development “Development of technology for the utilization of distiller fluid using natural sodium sulfate from the Aral region”, funding amount 12.0 million tenge
Additional information:	
2017 2018	Patents and copyrights: 1)Anarbaev A.A., Zhantasov K.T., Moldabekov Sh.M. Patent №2101 The method of producing sodium carbonate. From 02.03.2017 1) Anarbaev A.A., Tleuov A.S., Tleuova S.T. PatentRK №104473 Method for processing of lead-containing slags, dated 09/19/2018

FULL NAME: Aidarbek AlibekulyBolysbek *E-mail: aidarali@mail.ru*	
Education:	
2002	M. Auezov South Kazakhstan State University. Graduation (Technology of Inorganic Substances)
2006	M. Auezov South Kazakhstan State University. Candidate (PhD) thesis defense (Geoecology)
Work experience:	
Academic:	
Work in this organization	
2002-2018	M. Auezov South Kazakhstan State University. Engineer, teacher, senior teacher, associate professor, senior lecturer, head of

	the registration office, dean of the higher school "Chemical Engineering and Biotechnology"
Discipline	Doctoral Student Scientific Advisory
Period:	Employment (full time)
Professional development:	
2014-2016 2017	Scientific internship at the Technical University of Munich (Germany); Advanced training at Kazphosphate LLP
Membership in professional organizations:	
2014-2018	M. AuezovSouthKazakhstanStateUniversity,Member of the Republican educational-methodical council of the Ministry of Education of the Republic of Kazakhstan
Awards and prizes:	
2018	The best university teacher
Service activities:	
2012-2014 2017-2018 2018-2019	Executor: 1. International project Sfp 983945 "Assessment of transboundary water pollution in Central Asia" 2012-2015. (Order No.349-k dated June 28, 2012) 2. Contract-basedresearchanddevelopment №2106 The establishment of new opportunities to improve the agrochemical value, improve the physico-chemical and consumer properties of ammonium nitrate from 11.07.2017. on December 31, 2017 (order №599-zhk from 13.07.2017) 3. Contract-basedresearchanddevelopment №23-1/18 "Аммиак селитрасының агрохимиялық құндылығын жоғарылатудың, физика-химиялық және тұтынушылық қасиеттерін жақсартудың жаңа мүмкіндіктерін айқындау" (order №364- zhkfrom 02.04.2018г.);
Publications and presentations:	
over the past5 years	Total number–more then50 1. Technology basis and thermodynamic analysis of an acid decomposition process of phosphorus slime. - Oriental journal of chemistry. 2017, Vol 33 (3). P P 2041-2047 2. Preparation of photochemical coatings of metal films (copper, silver and gold) on dielectric surfaces and studying their antimicrobial properties. Colloids and Surfaces A: Physicochemical and Engineering Aspects, Oriental journal of chemistry..2017.Vol.33. №(3) P.1331-1336 3. Composition, structure and properties of water. Monograph. Shymkent, 2015. - 6.7 pp. 4. Chemistry and technology for the production of technical salts. Tutorial. Shymkent, 2015. 160 p. 5. Chemistry and technology of inorganic substances. - Tutorial ..2017g. p. 60. 6.Thermodynamic analysis of chemical reactions of decomposition of chlorine-containing salts of distiller sludge with phosphoric acid. - works of the International Scientific and Practical Conference " Auezov reading-15: The Third Modernization of Kazakhstan - New Concepts and Modern Solutions", dedicated to the 120th anniversary of M.Auezov. - Shymkent, 2017. –P. 33-37
New scientific developments:	
2013-2016 2015–2020	1) Executor of the international grant of the NATO Science Committee for the Science for Peace and Security Program "Assessment of Transboundary Water Pollution in Central Asia" 2) Executor of the state budget theme "Research on the development of new

	technologies for complex fertilizers based on waste phosphate production and coal mining, the determination of the physicochemical properties of water-salt mixtures from the specific energy indicators of ions."
Additional information:	
2015 2015 2018 2018	Patents and copyrights: 1) Certificate of state registration of rights to the object of copyright No. 1537 - electronic educational edition "Test book for the discipline" Chemical technology of inorganic acids, bases and salts "; 2) Certificate of State Registration of Rights to the Object of Copyright No. 912 - electronic textbook "Theoretical Foundations of Inorganic Substances Technology"; 3) Certificate of state registration of rights to the object of copyright № 01444 - textbook «Сода және азот қосылыстар өндірістерінің технологиялық негіздері мен есептеулері»; 4) Certificate of state registration of rights to the object of copyright number 0160 - textbook "Chemistry and technology of inorganic substances."

Annex 12. Types of scientific-research work of teaching staff

№	Types of works	Completing of the work
1.	Preparation and publication of a scientific article in a scientific journal	54
2.	Preparation of reports (publication of theses) at international or republican conferences	223
3.	Preparation and publication of a scientific article in intercollegiate scientific collections	46
4.	Preparation and publication of a scientific monograph	5
5.	Participation in planned research, work on contracts with outside organizations	18
6.	Development and preparation for the publication of textbooks	19
7.	Development of training manuals and their preparation for publication	52
8.	Participation in scientific (theoretical) conferences, scientific meetings and symposia	205
9.	Review of scientific papers, monographs	5
10.	Review of textbooks, manuals	7
11.	Thesis Review	8
12.	Editing of scientific papers, textbooks, textbooks, monographs, etc.	8
13.	Business trips related to the implementation of scientific work	27
14.	Writing reviews for articles and tutorials	26

Annex 13. Intellectual baggage of teaching staff for five years

Intellectual baggage of faculty for five years

№	Teaching staff (in alphabetical order)	Portfolio							
		Journal articles from the CCES list	Magazine articles with non-zero factor factor	Articles in collections of international conferences	Opposition to the defense of doctoral theses	Preparation of textbooks with (ISBN)	Development of electronic textbooks	Development of manuals with (ISBN)	Monographs
1.	Anarbayev A.A.	7	2	18	-		4	6	2
2.	Besterekov U.	22	5	28	1	3	5	5	2
3.	Bolysbek A.A.	7	7	40	-	2	8	6	2
4.	Eskendirov M.Z.	2	5	16	1	2	2	1	1
5.	Zhantasov K.T.	12	10	12	-	7	3	9	1
6	Dzhanmuldayeva Zh.K.	8	2	17	-	4	11	9	2
7	Kadirbayeva A.A.	12	4	17	-	2	4	7	
8	Koshkarbayeva Sh. T.	17	11	35		1	6	8	3
9	Nazarbek U.B.	30	10	50	-	18	25	10	2
10	Satayev M.S.	20	11	35	2	1	6	8	3
11	Seitmazimova G.M.	1	3	21	-	2	2	3	
12	Tleuov A.S.	15	8	27	8	4	4	25	3
13	TleuovaS.T.	12	6	25	2	3	3	23	2

Annex 14. The list of types of academic work of teaching staff in the framework of programs

The list of types of academic work of teaching staff in the framework of programs

№	Types of works	Completing of the work
1.	The list of disciplines, which were held and held lectures	9/100%
2.	Slide lecture recording	9/100%
3.	Lecturing in a foreign language	1
4.	Acceptance of oral and written examinations in the process of mastering educational programs	9/100%
5.	Receiving reports on the results of teaching and work experience	100%
6.	Admission to the Master's programme	3
7.	Scientific management of doctoral theses	13
8.	Acceptance of written state exams	4
9.	Conducting graduate work / project protection training (“pre-defense”)	13
10.	Verification of the results of written test tasks for entrance tests and final testing	3
11.	Leadership research and teaching practices (including the preparation of tasks, checking reports and taking credit for practice)	3
12.	Leadership research students (head of the scientific circle)	1
13.	Scientific leadership of the student participating in the competition of student research papers: - international or republican - Interuniversity, University	10

Annex 15. Types of methodological and organizational work of teaching staff

№	Types of works	Completing of the work
1.	Control visits (for department heads), class visits	3/100%
2.	Participation in scientific and methodological conferences, meetings, seminars, meetings of Soviets, departments, subject methodical commission	100%
3.	Teaching staff at refresher courses	13/100%
4.	Improving pedagogical qualifications (work in the library, participation in the work of methodical schools, seminars, etc.)	12
5.	Compilation of electronic textbooks on academic disciplines	5
6.	Consultation on the development of supervising training programs (e-courses)	5

	on the subject	
7.	Development of modular test tasks	100%
8.	Development of guidelines and instructions for conducting training sessions using distance learning technologies	1
9.	Development of the program and tickets for the specialty for state (final) certification	3
10.	Development of practical tasks in the disciplines	4
11.	Development of laboratory workshops in the disciplines (including for conducting classes using distance study technologies)	2

Annex 16. Themes of EP «Chemical technology of inorganic substances" doctoral students theses

Full name of doctoral students	Doctoral Theme	Scientific Consultants
2012admission year		
Turakulov Bakhridin	Development of technological bases for the production of chromite pigments from industrial waste for printing cotton and blended fabrics.	Ph.D., professor Zhantasov K.T. D.Sci., Professor M. Baklanov IMES, Belgium
Kaldybaev Almaz	Development of scientific and technological bases of adsorption gas purification from sulfur dioxide by a sorbent from phosphorus production wastes	Ph.D., Professor B.S. Shakirov, Ph.D., professor Zhantasov K.T. D.Sci., Professor M. Baklanov IMES, Belgium
2013admission year		
Nazarbek Ulzhalgas Bakhytovna	Development of technology for the processing of phosphate sludge on target products for fertilizing	Doctor of Technical Sciences, Professor U. Besterekov Doctor of Technical Sciences, Professor Petropavlovskiy I.A. (Russian University of Chemical Technology; DI. Mendeleev, Moscow, Russian Federation)
Azimov Abdugani Mutalovich	Development of desalination technology for natural and industrial waters using membrane purification methods.	Doctor of Technical Sciences, Professor Shakirov B.S. Doctor of Technical Sciences, Professor Zhantasov K.T. Doctor of Technical Sciences, Abiyev R.Sh. (St. Petersburg State Institute of Technology, St. Petersburg, Russian Federation)
Omarov Bekzhan	Development of an innovative technology for obtaining complex humate-containing mineral fertilizer	Doctor of Technical Sciences, Professor Zhantasov K.T. Doctor of Technical Sciences, Professor Moldabekov Sh. Doctor of Technical Sciences, Professor Dormeshkin OB,Belarusian State Technological University, Minsk (Republic of Belarus)
2014 admission year		
Abdurazova Perizat Adilbekovna	Development of technology for the photochemical deposition of copper-containing films on dielectric materials and the study of their bactericidal	Doctor of Technical Sciences, Professor Sataev MS, Ph.D., Associate Professor

	properties.	Kosharbaeva Sh. T. Doctor of Technical Sciences, Professor P.Prokopovich UK, Cardiff University
Nalibayev Makhmut Ibraikhanovich	Study of the technological basis for the synthesis of nitrogen, phosphorus, potassium and sulfur-containing fertilizers using oil-bitumen rocks	Doctor of Technical Sciences, Professor Ж Zhantasov KT, Doctor of Technical Sciences, Professor Dormeshkin OB,Belarusian State Technological University, Minsk (Republic of Belarus)
Shalatayev Serik Shoraevich	Research of technological bases of glyphosphate synthesis using local raw materials	Doctor of Technical Sciences, Professor Zhantasov KT, Doctor of Technical Sciences, Professor Petropavlovsky I.A. Russia, RCTU them. D. Mendeleev
2015 admission year		
Arystanova Saltanat Dauytbekovna	Development of technology for producing sorbents from natural mineral raw materials for the purification of phosphorus-containing sludge	Doctor of Technical Sciences, Professor A. Tleuov, Doctor of Technical Sciences, Professor B.A. Lavrov St. Petersburg State Institute of Technology, Russian Federation
2016 admission year		
Userbaeva Banu Abdraymovna	Development of technology for producing multifunctional adsorbents from bitonite clays of South Kazakhstan	Ph.D., Associate Professor Tleuova S.T., Doctor of Technical Sciences, Professor B.A. Lavrov St. Petersburg State Institute of Technology, Russian Federation
Ermekov Sayat Rakhymbayevich	Establishing patterns of changes in the chemical and phase composition, structure and physicochemical properties of water-salt systems, their applied significance in halurgic technology	Doctor of Technical Sciences, Professor U. Besterekov, Doctor of Technical Sciences, Professor IA Petropavlovsky, Russian University of Chemical Technology; DI. Mendeleev, Moscow, (Russian Federation)
2017 admission year		
Abzhalov Ramshad Sadykovich	Development of the technology of chemical coatings with the use of photochemical processes	Doctor of Technical Sciences, Professor Sataev M.S., Ph.D., associate professor Koshkarbayeva Sh.T., PhD doctor, professor Prokopovich P. Cardiff University, (UK)
Zhanikulov Nurgali Nodiruly	Creation of energy and resource saving technologies of Portland cement and wall ceramics using coal production waste and technogenic raw materials	Doctor of Technical Sciences, Professor B.T. Taymasov, Candidate of Technical Sciences, Professor Zh.K. Dzhanmuldayeva, Doctor of Technical Sciences, Professor Borisov I.N. Belgorod State University. V.G. Shukhov, (Russian Federation)
Zhumadilova Zhazira Tulzhanovna	Development of the technology of environmentally safe mixed fertilizers with the use of glauconite	Doctor of Technical Sciences, Professor Zhantasov KT, Doctor of Technical Sciences, Professor Dormeshkin OB, Belarusian State Technological University, Minsk (Republic of Belarus)
Kydyralieva Aziza Dosymbekkyzy	Improvement of ammonium saltpeter technology to improve physicochemical	Doctor of Technical Sciences, Professor U. Besterekov, Doctor of Technical Sciences, Professor IA

	and agrochemical characteristics	Petropavlovsky, Russian University of Chemical Technology; DI. Mendeleev, Moscow, (Russian Federation)
Omirova Rayhan Zholdasbayevna	Development of the technology of complex mineral fertilizers with improved agrochemical properties using hydrogel	Ph.D., Associate Professor Bolysbek AA, Doctor of Chemical Sciences, Professor A.T. Jalilov, Director of Scientific Research Institute of Chemical Technology, Tashkent, (Uzbekistan)
Pazylova Dana Temirbekovna	Development of the technology of non-ferrous metal chlorides' extraction from lead production slag with distiller waste application	Doctor of Technical Sciences, Professor A. Tleuov, Doctor of Technical Sciences, Professor V. M. Shevko, Doctor of Technical Sciences, Professor B.A. Lavrov St. Petersburg State Institute of Technology, St. Petersburg, (Russian Federation)
Smaylov Bақyt Matkarimuly	Development of the technology of chelate polymer-containing fertilizers based on cottrell dust and coal waste	Doctor of Technical Sciences, Professor A. Tleuov, Doctor of Technical Sciences, Professor O. Beysembaev Doctor of chemical sciences, professor Zakirov B.S. Director of the Institute of General and Inorganic Chemistry, Academy of Sciences of the Republic of Uzbekistan, (Uzbekistan)
Tileuov Hamidulla Yesbolovich	Technology of cleaning the gases from sulphur dioxide by means of the suspension of marl and fly ash	Doctor of Technical Sciences, Professor Eskendirov MZ, Doctor of Technical Sciences, Professor Dmitrevsky B.A. St. Petersburg State Institute of Technology, St. Petersburg, (Russian Federation)
2018 admission year		
Asylkhankyzy Aygerim	Development of technology for producing potash fertilizers from carnallite ores of the Chelkar deposit	Ph.D., Professor Seitmagzimova G.M., Ph.D., professor Dzhanmuldayeva Zh.K., Doctor of Technical Sciences, Professor I. Petropavlovsky, Russian University of Chemical Technology DI. Mendeleev, Moscow (Russian Federation)
Atyrkhanova Karlygash Kasymkhankyzy	Development of technology for the agglomeration of phosphate raw materials using boron compounds	Doctor of Technical Sciences, Professor A. Tleuov, Doctor of Technical Sciences, Professor V. M. Shevko, Doctor of Technical Sciences, Professor B.A. Lavrov St. Petersburg State Institute of Technology, St. Petersburg, (Russian Federation)
Asilbekova Gulnur Tolenyky	Development of technology for producing composite coatings based on dielectric particles of increased hardness	Doctor of Technical Sciences, Professor Sataev MS, Ph.D., associate professor Koshkarbayeva Sh.T. Doctor of Chemistry, Professor I.V. Perminova, Moscow State University

		Mv Lomonosova, Moscow, (Russian Federation)
Dikanbaeva Ayzhan Kosybayevna	Development of technology for the production of magnesium sulfate based on the processing of chrysotile asbestos production wastes	Doctor of Technical Sciences, Professor Sataev MS, Ph.D., associate professor Koshkarbayeva Sh.T. Ph.D., Professor I.V. Perminova, Moscow State University Mv Lomonosova, Moscow, (Russian Federation)
Ziyat Aytzhan Zhumadullauly	Development of technology for producing long-acting mixed fertilizers containing phosphogypsum	Doctor of Technical Sciences, Professor Zhantasov K.T. Doctor of Technical Sciences, Professor B.A. Lavrov St. Petersburg State Institute of Technology, St. Petersburg, (Russian Federation)
Kambatyrov Maksat Batyrovich	Development of technology for producing feed additives based on industrial waste	PhD, associate professor Nazarbek U.B., Doctor of Technical Sciences, Professor I. Petropavlovsky Russian University of Chemical Technology DI. Mendeleev, Moscow (Russian Federation)
Kareeva Anar Isakhankyzy	Development of the production technology of complex-mixed NPK fertilizers based on phosphate raw materials	Doctor of Technical Sciences, Professor U. B. Besterekov, Doctor of Technical Sciences, Professor Petropavlovskiy I.A. Russian University of Chemical Technology DI. Mendeleev, Moscow (Russian Federation)
Kozhakhmetova Aidana Maratkyzy	Development of technology for producing long-acting mixed fertilizers with trace elements based on non-coordination phosphate-siliceous raw materials and waste of thermal power plants	Doctor of Technical Sciences, Professor Zhantasov KT, Doctor of Technical Sciences, Professor Dormeshkin OB, Belarusian State Technological University, Minsk, Republic of Belarus

Annex 17. Information about professional development teaching staff, involved in the implementation EP «Chemical technology of inorganic substances»

№	FULL NAME. lecturer, academic degree, title, position	Advanced Training Location	Advanced TrainingTerms	Advanced Training Results
1	Tleuova Saltanat Talipovna, Associate Professor	Nazarbayev University, Astana, Great Britain? University High Water, Edunburg	10.06. - 20.06.2015 22.06-26.06.2015	Advanced training program "Research University"
2	Bolysbek Aidar Alibekuly,Associate Professor	Taraz, Kazphosphate LLP, Mineral Fertilizers Plant, Ammophos Production Shop	03.05.10-20.06.2016	Lectures on the subject "Technology of nitric-acid processing of phosphate raw materials"
3	Kadirbaeva Almagul Akkpeykyzy, Associate Professor	Aktau, KazAzot LLP, Ammonia Synthesis shop ”	02.06.-1.08.2016	Summary of lectures on the subject "Modern technologies of complex mixed fertilizers"

4	Besterekov Uylesbek, Doctor of Technical Sciences, Professor	D.I. MendeleevRussian University of Chemical Technology, Moscow? Russian Federation	29.10.16-11.11.2016	The textbook "Chemistry and technology of inorganic substances"
5	Zhantasov Kurmanbek Tazhmakhanbetovich Doctor of Technical Sciences, Professor	St. Petersburg State Institute of Technology (Technical University), St. Petersburg	10.10.2016 - 20.10. 2016	Textbooks "Intended chemical processes", "Physical chemistry of melts"
6	Dzhanmuldaeva Zhanyl Kemaladinovna, Associate Professor, Professor	Institute of Chemistry and Technology in Prague, Czech Republic	5.12 -12.12.2016	The course of lectures "Chemical kinetics and catalysis" and "Industrial water treatment"
7	Tleuova Ayym Bolatbekovna, PhD, senior teacher	Technical University Chemnitz, Chemnitz, Germany	5.12-15.12. 2016	The introduction of the results of the research in the course content "New methods for producing composite coatings"
8	Seitmagzimova Galina Maniulovna, Professor	Polytechnic University of Valencia, Spain	15.01. 2017 – 21.01.2017	Development of a new educational program in English, consistent with the EL.
9	Kadirbaeva Almagul Akkpeykyzy, Associate Professor	Belgium, Brussels, KI Leuven University,	18.06. - 01.07.2017	Scientific seminar “Innovative approaches to teaching and learning”, the introduction of new teaching methods in the educational process
10	Nazarbek Ulzhalkas Bakytkyzy, PhD, Associate professor	Belgium, Brussels, KI Leuven University,	18.06. - 01.07.2017	Scientific seminar “Innovative approaches to teaching and learning”, the introduction of new teaching methods in the educational process
11	Kadirbaeva Almagul Akkpeykyzy, Associate Professor	Almaty, Science and Technology Park KazNU. Al-Farabi, Innovation Center,	23.10-4.11.2017	Advanced training in the program "Management in Education"
12	Sataev Malik Syvambaevich, Doctor of Technical Sciences, Professor	Belarusian State Technological University, Minsk	7.05-19.05.2018	Tutorial "Chemical power sources"
13	Tleuova A.B.	Overseas internship program 14 Junior Researcher positions (postdoc/junior) researchersUniversity of Chemistry and Technology in Prague, Czech Republic	1.07.2018 – 1.07.2020	Starting of Advanced Training 1.07. 2018

Annex 18. Information on external academic mobility of students (training and internship)

№	FULL NAME	Educational programs (period of probationor internship)	Practice period (amount of loans taken)	Host organization / company
1.	Bakhridin Turakulov	6D072000 – Chemical Technology of Inorganic Substances, Scientific internship	2014	Belarusian State Technological University, Minsk, Belarus
2	Almaz Kaldybaev		2014	Belarusian State Technological University, Minsk, Belarus
3	Ulzhalgas Bakhytovna Nazarbek		2015	Russian Chemical and Technological University. DI. Mendeleev, Moscow, Russian Federation
4	Abdugani Mutalovich Azimov		2015	University of Cardiff (UK)
5	Omarov B.		2015	Belarusian State Technological University, Minsk, Belarus
6	Perizat Adilbekovna Abdurazova		2016	St. Petersburg State Institute of Technology, St. Petersburg, Russian Federation
7	Makhmut Ibraikhanovich Nalibayev		2016	Belarusian State Technological University, Minsk, Belarus
8	Serik Shoraevich Shalatayev		2016	Russian Chemical and Technological University. DI. Mendeleev, Moscow, Russian Federation
9	Saltanat Dauytbekovna Arystanova		2017	St. Petersburg State Institute of Technology, St. Petersburg, Russian Federation
10	Banu Abdraymovna Userbaeva		2018	St. Petersburg State Institute of Technology, St. Petersburg, Russian Federation

Annex 19. Graduates of the educational program

Educational program/ awarded academic degree	Academic year 2014-2015	Academic year 2015-2016	Academic year 2016-2017	Academic year 2017-2018
PhD	2	3	3	1
Total	2	3	3	1

Annex 20. Characteristics of computing equipment available to educational program

1 Providing access to information resources

№		Accessibility		Operation mode	
		Yes	Not	Free	On schedule
1.	Access to teachers' computers	+		+	

2.	Access to computers by specialists	+		+	
3.	Availability of allocated time for work on the Internet for teachers	+		+	
4.	Availability of time allocated for work on the Internet for specialists	+		+	

2. Used software products with indication of courses, disciplines

2.1 In the general block:

№	The name of the software product	Courses / Disciplines
1.	Windows XP, 7, 8, 10, MS Office 2003, 2007, 2010. AutoCAD Turbo Pascal.9, Kaspersky Anti-Virus,3D Studio Max, Macromedia Flash, Maya, Publisher, Borland Delphi, Visual C++, Adobe Photoshop, MathCAD, Corel Draw, My SQL Server etc.	1-3

2.2 BIn the block of specialization:

№	The name of the software product	Courses / Disciplines
1.	Complex program “Astra”	1-3 /Doctoral dissertation
2.	OutkumpuHSCChemistry 5.1.	1-3 /Doctoral dissertation
3.	AutoCADTurbo	1,2 /Doctoral dissertation

Annex 21. The list of instruments and equipment used in the educational and scientific processes in the educational program

1. Analytical scales
2. Laboratory ionomer I-160MI
3. Microscope stereoscopic MBS-10
4. Photometric sedimentometer FSH-6K
5. Arsenic analyzer PAN-As
6. Photometer photoelectric KFK-3
7. Colorimeter photoelectric concentration KFK-2
8. DR6000 Digital Refractometer
9. Measuring instrument of density of liquids vibration "VIP-2MR"
10. Vibration micromill IKATubeMillcontrol
11. Thermostats liquid circulating
12. Electric muffle furnace
13. Drying cabinet SHS-80
14. Laboratory tube electric furnace
15. Distiller
16. Distiller
17. Laboratory flotation machine FL240-02M-3L
18. Laboratory adsorption unit
19. Laboratory thermostat with heating and cooling function
20. Vacuum filtration device
21. Four-door fridge freezer
22. Microspin 12 High Speed Mini Centrifuge
23. Orbital Shaker
24. Laboratory setup for the study of various methods of drying materials
25. Laboratory setup for studying multi-stage filtering.
26. Ultrasonic bath "Laborette 17"
27. Vibrating screen sieve "Analyzette 3"

28. Ball mill
29. Potentsiostat-galvanostat R-4
30. LOIPLB-160 water bath with TS81B control module
31. Atomic absorption spectrometer "KVANT-2"
32. Computer device multifunction PSH-K
33. Analyzer Flame photometric PFA 378
34. Scanning UV spectrometer PE-5400UF
35. Stationary hardness tester for micro-Vikkers NOVOTESTTC-MKV
36. Ultrasonic Hardness Tester TKM-459
37. Wile-65 hygrometer
38. Spectrometer "Analyst 800" with multiparameter kipperskaner PCD 650
39. Installation of reverse osmosis Arium-6131

Annex 22. Funding and material provision of the educational program

Academic year	Funds for the educational process in the framework of the EP, tenge		
	General financing of EP	Funds for staff remuneration	Funds for purchase of technological equipment, devices
2014/2015	101543800	70388028	4832000
2015/2016	96859600	71796480	46120400
2016/2017	109073400	50008176	49687200
2017/2018	100961654	51800544	2000000
Итого	**321264454**	**243993228**	**102639600**