Kazakh Agrotechnical University named after S.Seifullin

Reviewed
at the meeting
of faculty council
Protocol № 12 from 24.04.19

Approved by
Dean of the Energy Faculty

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24.04.2019
(day month, year)

EDUCATIONAL PROGRAM DEVELOPMENT PLAN
6B062 - "Telecommunication networks and systems"
7M062– "Multiservice telecommunication technologies"
for 2019-2024

Considered at an expanded meeting of the department "Radio Engineering, Electronics and Telecommunications"

Content

1 Passport of the plan for the development of educational programs of the bachelor's program “Telecommunication networks and systems” and the master's program “Multiservice telecommunication technologies” for 2019-2024

1	Grounds for developing a development plan for the EP	The basis for the development of plan of the EP “Telecommunication networks and systems”, “Multiservice telecommunication technologies” is the improvement and effective implementation of educational programs of the specialty. The strategy and tactics of the EP development plan are developed in accordance with the educational policy of the Republic of Kazakhstan, the main goal of which is to train highly qualified personnel that meet the needs of the state and interested parties.
2	The main developers of the development plan	Head of Department, Ph.D. Tolegenova A.S., teaching staff of the department "Radio Engineering, Electronics and Telecommunications"
3	Timing for the implementation of the EP development plan	2019-2024
4	Volume and sources of financing	-
5	Expected results of the implementation of the OP development plan	The expected results of the implementation of the development plan of the EP “Telecommunication networks and systems”, “Multiservice telecommunication technologies” are: improving the quality of educational services to an international level; improving the efficiency of the educational process through the widespread introduction and application of innovative technologies in the educational process of the department "Radio Engineering, Electronics and Telecommunications"; improving the effectiveness of scientific research and their application in the educational process, improving the quality of the educational and research base, teaching materials.

2 analytical justification of EP

2.1 Information about educational programs: Educational programs of the bachelor's program "Telecommunication networks and systems" and the master's program "Multiservice telecommunication technologies" are developed in accordance with the National and European qualifications frameworks, professional standards, agreed with Dublin descriptors. Developed on the basis of the State Compulsory Standard of Higher Education, approved by the Decree of the Government of the Republic of Kazakhstan dated October 31, 2019 No. 604 Educational programs are designed on the basis of modular systems for the study of disciplines and consist of modules that form general educational and professional competencies. Educational programs were created based on the request of employers, in accordance with national development priorities and with the development trend of communication technology.

2.2 Student Information

At present, 88 students and undergraduates are studying undergraduate educational programs “Telecommunication networks and systems” and master's programs “Multiservice telecommunication technologies”. The contingent of students studying first-year undergraduate educational programs and the contingent of undergraduate students without taking into account the 2020-2021 academic year are presented in Table 1 and 2, respectively.

Table 1 - The contingent of students studying 2020-2021 in the educational program of undergraduate "Telecommunication networks and systems"

	Course 1 2019-2020
In the state language	49
In Russian	18
In multilingual language	-
Full-time - distance learning	8
Total	75

Table 2 - The contingent of undergraduate students

	Course 1
Scientific and pedagogical direction	13
Profile direction	-
Total	13

2.3 Internal conditions for the development of EP

In connection with the reduction of class hours for the effective implementation of credit training technology, the use of innovative teaching methods is of particular importance. Technological support for students of the considered EP is carried out as follows: interactive teaching methods are actively used in laboratory studies on the basis of virtual and software-hardware laboratory and practical complexes. In the EP "Telecommunication Networks and Systems" innovative teaching methods are constantly being introduced using interactive whiteboards, virtual laboratories, and digital educational resources. In the classroom, teachers of the department widely use a wide variety of traditional, innovative technologies, such as: "brainstorming", syncwine, cluster, RAFT technology, Smart Education, problem-oriented learning or PBL.

2.4 Characteristics of the surrounding society. The laboratory base of educational programs meets the requirements of the time and covers a wide range of technologies and theories on communication systems, the department has entered into agreements and contracts with enterprises for passing educational, industrial and undergraduate practice. Currently, there are agreements on educational programs with 20 specialized enterprises and organizations. Every year, representatives from industries are attracted to lecture. In order to develop academic mobility and double-degree education, partner universities are being sought among foreign countries, countries of the customs union and the CIS.

In order to provide high-quality training for specialists, the Department of "Radio Engineering, Electronics and Telecommunications" is working to expand international cooperation, which is carried out in two main areas - internships for teachers and students, the organization of scientific-experimental and scientific-pedagogical practices in other universities. The department has agreements on cooperation with organizations from Belarus, Bulgaria, the Czech Republic, Poland, Russia,

Uzbekistan. To date, the department successfully cooperates with the Belarusian State University of Informatics and Radioelectronics, the Siberian State University of Telecommunications and Informatics and Tomsk Polytechnic University.

2.5 Information on teaching staff implementing educational programs

The faculty is the main resource for the mission of the university. In this regard, much attention is paid to the selection and training of personnel. The staff for the preparation of educational programs is staffed in accordance with the legislation of the Republic of Kazakhstan and the Rules for competitive replacement of posts of scientific and pedagogical staff of higher educational institutions. The faculty consists of 29 employees, of which 5 are doctors of technical sciences, 12 candidates of sciences and 7 masters. The qualification of the faculty of the department is fundamental to the quality of the educational services provided and provide is a systematic assessment of the competence of teachers by the university administration. To better ensuring the educational process, the department invites graduate teachers, graduate students and doctoral students to work. EP in relation to teaching staff requires compliance with basic education, teaching experience, competence in the taught discipline. The teaching staff of the department meets the qualification requirements for licensing educational activities and has full knowledge of modern teaching methods, which allows to organize an effective educational process.

In accordance with the Law of the Republic of Kazakhstan “On Education”, all teachers undergo advanced training at the republican and international levels at least once every 5 years, certificates are affected. Further training of teaching staff is carried out in accordance with the main activities of the department, which are conducting research and teaching disciplines in the field of radio engineering, electronics and telecommunications. Practicing teachers by, using their practical experience, introduce them into the educational process in the form of business games, situational tasks, thereby improving the mastery of the program of disciplines, and developing the professional skills of a future specialist.

2.6 Characteristics of the achievements of the EP

Kazakh Agrotechnical University named after S. Seifullin participates in ratings such as the national ranking of demand for higher education al institutions of the Republic of Kazakhstan, which assesses the quality of educational programs by levels and areas of specialist training (IAAR) as well as the rating of the Republican Rating Agency Kazakhstan 2050 - National Rating for Innovations and academic excellence. The success of educational programs is determined by the systematic, focused and effective implementation of the goals and development plan of the cluster of the program developed above with the involvement of all interested parties, taking into account the satisfaction analysis of students and faculty / staff, analysis of the resources available and necessary for the program, including the material and technical base.

3 Characterization of the problems that the EP development plan is aimed at solving and substantiating the need for their solution: Educational programs are aimed at training personnel to carry out professional activities by graduates in the field of determining the optimal production and technological modes of telecommunication networks systems and multi-service technologies, developing promising telecommunication network projects and systems for various purposes, performing technological calculations for the preparation and commissioning telecommunication networks and systems, the choice of modes of operation and regulation of technological processes, control modes of telecommunication systems, the implementation of verification of measuring means of diagnosis and drawing up plans of repairing technological equipment of telecommunication systems, diagnosis, service and maintenance of telecommunications equipment and devices.

4 The main goals and objectives of the EP development plan with the timing and stages of its implementation: Educational programs "Telecommunication networks and systems", "Multiservice telecommunication technologies" were created on the basis of a request from employers, in accordance with national development priorities.

The main objectives of the development plan are as follows:

№	The name of the task	Development timeline	Stages of development
1	Providing conditions for obtaining a full, high-quality professional education	Entire period of education	The provision of educational services for the development of professional skills
2	The formation of basic professional competencies for future bachelors in educational programs	Entire period of education	Acquisition of professional competencies
3	Ability to work with scientific and technical literature, use domestic and foreign experience in professional activities, systematize and summarize the information received.	Entire period of education	Analysis and processing of the results
4	Consultations of employers and scientists of research institutes in the selection of relevant and practically significant topics of thesis and master's theses	End of undergraduate studies and start of graduate studies	Consultations of employers and stakeholders

The expected end results of the educational program imply a clear orientation towards the future, which is manifested in the possibility of constructing one's own education, taking into account success in personal and professional activities that meet the requirements of employers.

5 Measures to reduce the impact of risks for the EP:

For educational activity, as well as for any other, characteristic specific risks inherent only to it. This must be taken into account when developing measures to manage these risks. Therefore, risk management methods should be adjusted in accordance with the tasks assigned to them. There is a need to develop a model that would allow you to effectively manage emerging risks in educational institutions, taking into account the specific features of educational activities. Speaking about the specific features of educational activity, it is necessary to highlight the intangibility of educational services, which manifests itself in the impossibility of assessing their quality and volume until complete acquisition, that is, until the moment when a graduate of a university receives a certain specialty, defending graduation qualification work. Another distinctive feature of educational services is the impossibility of their direct monetary measurement. The pricing mechanism is often not able to objectively assess the cost of educational services, which is associated with the difficulty of reflecting all the costs of educational activities. There are other features of educational activities. Each of them has certain categories of risks, which in turn are analyzed and managed by different methods.

Risks of educational activities:

1 Insufficient recruitment of applicants;
2 Insufficient provision of the level of quality of educational services;
3 Inconsistency of educational and methodological support to modern requirements;
4 Lack of funding for educational activities;
5 Lack of qualified teaching staff;
6 Inadequate information support of the educational process;
7 Changes in the market for educational services;
8 Increasing the cost of educational services;
9 Making the wrong strategic decisions;
10 Incorrect allocation of budget funds;
11 Losses associated with the incompetence of teaching staff.

Risk analysis focuses on promoting risk understanding. It provides data for risk assessment and decision making regarding the need to consider risks and the most appropriate strategies and review methods. At the end of the school year, process managers submit a risk management report to the quality service. After submitting reports, IC conducts risk management analysis once a year. Until November 1 of this year, department heads are developing a risk management plan. In July, over the past academic year, each process manager submits a report according to a risk management plan. The risk map,

the risk management plan are reviewed and approved by the Management Board of Kazakh Agrotechnical University named after S.Seifullin in December of this year.

The approved risk management plan and risk map are submitted for consideration by the Board of Directors by the First Deputy Chairman of the Management Board.

Risk monitoring consists in controlling the level of risk. This is achieved by updating on a regular basis (once a year) information on risks, risk management measures, status of the implementation of measures, as well as by monitoring the degree of influence and probability of occurrence of risks developed earlier at the stage of risk identification and assessment.

6 Action Plan for the Development of EP

№	Name of events	Terms of implementation	Responsible	Expected results	Resource provision
1	Formation of a commission for the development and adjustment of educational programs	2019-2023 June	Tolegenova A.S., teaching staff	EP Development Commission	Personnel, library, electronic resources
2	Development and adjustment of goals and objectives of educational programs	2019-2023 June	Tolegenova A.S., teaching staff	Goals and objectives of the educational program	Personnel, library, electronic resources
3	Determining the competencies of a specialist sheet and specialty disciplines	2019-2023 June	Tolegenova A.S., teaching staff	Specialist competencies and specialty disciplines	Personnel, library, electronic resources
3	Development of a common position on the competencies of the educational program of specialists with employers	2019-2023 June	Tolegenova A.S., teaching staff	Positions on the competencies of EP specialists with employers	Personnel, library, electronic resources
4	Formation of the educational program in accordance with professional standards	2019-2023 June	Tolegenova A.S., teaching staff	EP in accordance with professional standards	Personnel, library, electronic resources
5	Drawing up an academic calendar and a working curriculum for a specialty in accordance with the developed educational program	2019-2023 June	Tolegenova A.S., teaching staff	Academic calendar and work curriculum for the specialty in accordance with the developed EP	Personnel, library, electronic resources
6	Consideration of the educational program at an expanded meeting of	2019-2023 June	Department of Radio	Protocol of consideration of EP at an expanded meeting	Personnel, electronic resources

	the department with the participation of employers		Engineering, Electronics and Telecommunications, employers	of the department with the participation of employers	
7	Consideration and approval of the educational program at the academic council of the faculty	2019-2023 June	Members of the Council of the Faculty of Energy, employers	Protocol for the review of the educational program at the academic council of the faculty	Personnel, electronic resources

7 The mechanism for implementing the development plan of the EP: The development plan and goals of the EP are developed in accordance with national development priorities.

The EP development plan promotes the development of personal qualities among bachelors, as well as the formation of general cultural universal (general scientific, social, personal, instrumental) and professional competencies in accordance with the requirements of the standard in the direction of preparation of educational programs for the formation of professional competencies.

When drawing up the development plan of the EP, the availability of all necessary resources for the implementation of this EP was taken into account. To inform all interested parties, the University's website www.kazatu.kz contains the approved plan for the development of academic programs, draft work plans for disciplines, academic calendars and lists of elective disciplines. Catalogs of elective disciplines are available in the library.

In terms of the development of educational programs, the following were taken into account:

- Compliance with the training period, qualifications of the graduate, the complexity of training, structure, terminological apparatus and a number of other provisions, the main educational program;
- the continuity of the scientific foundations of the organization of the educational process, laid down in the educational program, the traditional foundations of the functioning of the education system, in particular, the principle of the unity of education, upbringing and training, an integrated approach to the organization of the educational process and the theory of the gradual formation of knowledge, skills of students;
- pedagogical traditions of the university, aimed at training high-class personnel of a wide profile, taking into account the specifics of the functioning of the country's economy in modern social conditions;
- Representation of the system of higher professional education as a step in the system of continuing professional education, the totality of educational institutions of which ensures the training of professional personnel;
- competency-based orientation of the entire pedagogical system and each of its elements, considering competence as a system of knowledge, abilities, skills, experience and personal, professionally oriented qualities of the graduate.

8 Assessment of the socio-economic effectiveness of the implementation of the development plan:

At the end of the school year, at a meeting of the department with the participation of all interested parties (faculty, employers), self-assessment of the EP is carried out, taking into account the changes made, the results achieved, the effectiveness and efficiency of the implementation of the EP are discussed.

- The relevance of the specialty and its prospects generates significant interest of applicants in this area: annually the UNT passing score is 65-94 points, and the set reaches, for example, 88 students for the 2019-2020 academic year.
- The stated goal of the EP meets the needs of the state, employers of individuals and students. The needs of the state are determined by the annual state order, which is at least 500 people, and according to the state order, at least 31-80 people enter Kazakh agro-technical university named after Saken Seifullin annually, which is 7 percent or more of the total state order in the Republic. In Kazakhstan, more than 14 universities are trained in this specialty.
- Kazakh Agrotechnical University named after S.Seifullin collaborates with 26 international organizations and programs from 9 countries: TEMPUS, ERASMUS MUNDUS, FAO, (European Union), TIKA, Mevlana Exchange Program (Turkey), MASHAV, (Israel) IAMO, LOGO eV, Konrad Adenauer Stiftung, DEULA, DAAD, APOLLO, John Deere, CLAAS, Wiehenstephan -Triesdorf (Germany), AF (French Alliance), ESA (France), Qualita Studio, FederBio, (Italy), Cochran Fellowship Program, USDA, USAID, Borlaug Fellow-ship Program, FULBRIGHT, (USA), JICA (Japan), Chinese Machinery Institute (China).
- The university has signed more than 200 agreements and memoranda of cooperation with universities and research centers from 35 countries. A full list of contracts and memorandums of S.Seifullin KATU with foreign universities is presented on the university website in the international cooperation section, the main directions of international cooperation development are also presented (http://kazatu.kz/ru/ob-universitete/centr-razvitiya-mejdunarodnogo -sotrudnichestva-i-poliyazichnogo-obrazovaniya / mejdunarodnoe-sotrudnichestvo). This information is useful for students and undergraduates specializing in Radio Engineering, Electronics, and Telecommunications when planning internships or implementing an external academic mobility program.
- The department "Radio Engineering, Electronics and Telecommunications" cooperates within the framework of agreements with leading foreign research centers, such as TPU Tomsk, TUSUR Tomsk, Siberian State Technical University named after prof. M.A. Bonch-Bruevich, MTUCI, Moscow, BSUIR, Minsk, TUIT, Tashkent, CTU, Prague.
- In the laboratories of the department "Radio Engineering, Electronics and Telecommunications" there are modern educational and research equipment, educational software and methodological complexes, designed for laboratory and practical work on cycles: "Theory of electrical circuits", "Digital signal processing", "Electronics and circuitry ",“ Digital

devices and microprocessor technology ”,“ Wireless communication technologies ”,“ Television and radio broadcasting ”. In the educational process, 7 specialized laboratories of the department are used that meet the requirements of SOSE.

There are unique training stands from National Instruments (NI) working in the LabView environment and laboratory equipment from UchPribor. In addition, there is laboratory telecommunications equipment for Cisco courses. Educational laboratory complex “Theory of electrical circuits”, “Electronics and circuitry”, “Digital signal processing”, etc. (computerized version).

It is planned to purchase laboratory equipment in the amount of 12,000,000 (twelve million) tenge in 2021.

The training of highly qualified scientific personnel through the master's program is carried out at the level of modern requirements. In 2021, it is planned to open an educational program for the preparation of PhD.

9 Model of the graduate of EP by level of education

The model of the graduate of educational programs for two levels of bachelor's education “Telecommunication networks and systems” and the master's program “Multiservice telecommunication technologies” is supplemented taking into account the national qualifications framework and the needs of key employers. The graduate model was developed by a working group on the basis of SOSE and was discussed with employers at a meeting of the department.

The bachelor in the specialty prepares for the following main types of professional activity: production and technology; design and technological; organizational and management.

At the same time, the professional and practical activities of a bachelor's graduate are associated, first of all, with the introduction and operation of modern telecommunication equipment, new systems for technical diagnostics of elements of telecommunication complexes, technical measures and preparation of projects aimed at improving the reliability and operational characteristics of telecommunication systems and networks. The scope of professional activity is the field of science and technology, which includes a combination of technologies, means, methods and methods of human activity aimed at creating conditions for the exchange of information at a distance.

A bachelor studying in the EP 6B062 - "Telecommunication Networks and Systems" must have the following competencies:

Types of professional activity

- Types of professional activity:
- production and technological;
- service and operational;
- organizational and management;
- installation and commissioning;
- settlement and design;
- experimental research.

Professional competencies:

- know the principles of work, technical characteristics, features of the used telecommunication systems and networks; know the necessary measures to ensure life safety and environmental protection during the design, construction and operation of telecommunication systems and networks;

- be able to develop the structure of telecommunication networks, design systems and telecommunication networks; perform calculations related to the choice of the values of the parameters of the network elements, the optimization of these parameters and operating modes using computer equipment and special programs; be able to analyze the reliability of

telecommunication networks and systems; be able to diagnose electronic devices of telecommunication systems; be able to choose the necessary electronic components (typical replacement elements) when repairing damage; have operational skills of the studied technical objects (tools and systems), have working skills in equipment with electronic components and computer systems and networks;

- to be ready for the design and operation of telecommunication systems and networks, including the design, construction, installation and operation of cable communication systems, computer networks, methods for conducting theoretical and experimental studies in the field of communication technology;
- be able to analyze the structure and capabilities of the main systems for transmitting and converting information about objects and systems, have the skills to develop and design on a modern elemental base the equipment and devices of information transmission, reception and distribution systems;
- be prepared for the operation of mobile communication systems; ready for operation of switching systems and communication networks; ready to operate computer networks, diagnose and evaluate the state of telecommunication systems using the necessary methods and means of monitoring and analysis.

The scope of professional activity of the Master of Technical Sciences (Engineering and Technology) in the field of multiservice telecommunication technologies:

- development, production, installation and technical operation of multiservice systems;
- implementation of scientific, experimental and design work in the field of convergent networks and systems;
- ensuring the technical readiness of communication equipment for work, timely and high-quality implementation of scheduled routine maintenance, technical inspections of equipment;
- monitoring the correct maintenance of technical documentation and the operation of multiservice communication systems.
- monitoring and compliance with safety requirements for the operation and maintenance of communication equipment;
- analysis of the operation of multiservice communications technical support tools in order to increase their reliability.

Types of professional activity:

- scientific (experimental) - research;
- production and technological;
- design;
- repair and maintenance;
- organizational and management;
- innovative,

- settlement and design;
- scientific and pedagogical.

The master should have the following professional competencies in terms of activities, be able to:
- draw up research and reporting documentation in accordance with established forms;
- own modern methods and software modeling tools;
- evaluate the competitiveness and economic efficiency of the developed multiservice

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electronics and telecommunications » A.S. Tolegenova