**II. Program self-examination**

**1 Objectives of the program**

The purpose of the educational program is to train bachelors in the area of competitive in the labor market infocomms.

**1.1. Consumers of the educational program**

Internal customers of the program include rectorate, students, higher-educational teaching personnel, providing the program realization, the staff involved in the process of its implementation, as well as graduate students, doctoral candidates. The group of external users include: employers, community organizations, government agencies and parents.

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| №  p.c | Consumer | Demands |
| 1 | The state represented by the Ministry of Education and Science of the Russian Federation,  Society | - Federal State Educational Standard requirements (FSES);  - Providing the required quality of the educational process when training students;  - Providing quality control of training of graduates. |
| 2 | Faculty and providing educational process staff members | - Providing of necessary working conditions and decent salaries;  - Providing of infrastructure and scientific and educational base of educational institutions, which allows to fully implement the goals of the educational program;  - Creation of conditions for the growth of skills and career development |
| 3 | Companies and Organizations | - A high level of professional competence of graduates requirement;  - Providing the necessary cultural level through the study of the natural sciences and the social and economic sciences;  - The formation of an active living position in innovation activities. |
| 4 | Applicants | -Image of an educational institution and experience of training specialists  [in the appropriate field](http://www.multitran.ru/c/m.exe?t=4320657_1_2&s1=%F1%EE%EE%F2%E2%E5%F2%F1%F2%E2%F3%FE%F9%E5%E3%EE%20%EF%F0%EE%F4%E8%EB%FF);  - Availability of the necessary for the preparation of competitive specialists material and technical resources and has high professional competences of teaching staff;  - Availability of the opportunity to preview of the nature of the activities of alumni, learning conditions and opportunities for self-development of students;  - Availability of educational institution site containing current information about the profession and the conditions of admission to the university. |
| 5 | Students and graduates | - Urgent character of the level of training of the present state of industry and research activities development;  -Modernity of technical base and educational technologies used in the learning process;  -Possibility to continue education in doctoral degree and Master's degree program  - The presence of a developed system of employment. |

**1.2 Demand for education program**

The education program is in demand because of its external and internal customers. Demand for educational program is proved by: satisfaction surveys of internal and external customers; direct communication with them; external customers' (employers') data in relation to the quality of the graduates' qualification.

The need for this educational program is determined by the level of demand and, consequently, customer satisfaction of the educational program. It can be described with the help of monitoring process of its demand and satisfaction with it, based on the collecting, processing and analysis of relevant information.

Monitoring is carried out in appropriate intervals, at least once a year. The main methods of obtaining data about the demand and program satisfaction are survey and questionnaire. Survey is the primary method. It can be carried out in the form of questionnaires, interviews, telephone conversations or correspondence with direct consumer (employer), official reviews, cooperation agreements, etc. Supervision is a secondary method and is carried out by consumer response to advertising, to the services results provided to other organizations.

Questioning (interviewing, job talk) is carried out by each customer individually. For each services customer a set of documents is issued, which stores the results of analysis, questionnaires, surveys, documented claims, complaints or program satisfaction evidences, as well as other documents and records relating to the work requirements and satisfaction of the work done.

A report containing the findings of the evaluation and recommendations for improving customer satisfaction is issued annually according to the results of a comprehensive evaluation of customer satisfaction. The report is the basis for the analysis of the monitoring results, indicating the degree of customer satisfaction, identifies priorities for improving the performance of which are used in the process of development of training processes planning for bachelors and resource allocation and strategic planning and development of the quality management system (QMS) of the faculty.

Thus, the results of questionnaire obtained in the course of monitoring the degree of satisfaction with the program among the students prove the demand of the program by the students. Monitoring was carried out on a number of factors: recording of the level of preparedness of the audience; relation with the material being studied for future professional activities; novelty and richness of information material being studied; clarity, persuasiveness and logical sequence in the presentation of the material. The vast majority of students are satisfied with the results.

Demand for the program is also supported by high valuations, which are obtained through the survey of employers (JSC "Rostelecom"). Appropriate competencies were taken for a basis of indicators. That competencies should show a graduate in the future professional activity: the ability to find partners and work with them to create and innovate, including consumers (organizer’s tools of creation and innovation); ability to analyze and forecast the state of the products market development in the topical area and to develop reasonable proposals for the creation and innovation on this basis (director of tasks tools); knowledge of the scientific foundations and principles of a product in the relevant topical field (fundamental intellectual tools); knowledge of the methods and the ability to use the fundamental intellectual tools to create products in the topical area (applied intellectual tools); availability of skills resulting from systematization of experience creating products in the topical area (applied tools of basic and applied knowledge realization).

Demand for the program supported by the contracts with the providers of the bases for the practice: JSC "Rostelecom", Federal State Unitary Enterprise "Russian Television and Radio Broadcasting Network", CJSC "SPE" Special-Radio "" (Belgorod), JSC "Medtech", JSC "Kamaz-Service" (Belgorod), etc. .; contracts with enterprises and organizations, that are to participate in the development of educational programs and research topics.

Demand for education program by consumers is supported by the following indicators and processes:

1 annual high competition for admission to the bachelor degree;

2 presence of applicants applying on a commercial basis;

3 the results of the questionnaire of senior school students and their parents as part of career guidance;

4 the presence of partnership agreements in the field of personnel training with a number of basic organizations and enterprises: JSC "Rostelecom", JSC "Medtech", Federal State Unitary Enterprise "Russian Television and Radio Broadcasting Network", JSC "KamazServis" and CJSC "Scientific and Production Enterprise (SPE) "SpetsRadio" (Belgorod)

5 indicators of employment: all graduates of course are employed or studying in graduate programs.

**1.3. Objectives of the educational program**

Objectives of the educational program are formed on the basis of the requirements of the Federal State Educational Standard.

The main purpose of the educational program is to develop knowledge, skills and methodological culture of graduates in the field of science and technology, which includes a set of technologies, tools, techniques and methods of human activity aimed at creating conditions for the exchange of information at a distance with the use of modern networks communication and connecting systems.

Objective 1: Knowledge of the principles of building communication systems and effective realization of information and communication technologies;

Objective 2: Basic knowledge of the engineering of communication networks and connecting systems, substantiation methods of the effectiveness of the engineering decisions based on multicriteriality and the necessity to protect information.

Objective 3: Usage of measuring instrumentation in order to monitor the quality of the connecting systems and communications operation, including an analysis of the characteristics of the processes of transmission and information security processes;

Objective 4: Possession of methodological culture of problem analysis and solution of problems of communication systems and technologies, including knowledge of the historical retrospective of communication systems and technologies, their role and the fundamental trends of modern development.

**1.4. The mission of the university**

Federal State Autonomous Educational Institution of Higher Professional Education "Belgorod State National Research University" (NRU "BSU"), as a center of education, culture, science and innovation sees its mission in the pursuit of the harmonious synthesis of current trends in higher education with historical university traditions. Among them special attention to the trinity of education, research and culture-functions of classical university is paid.

The mission of the university is contained in the Mission and Quality Policy of NRU "BSU." Mission and Quality Policy was developed and approved by the rector of the NRU "BSU" 28.01.2014.

**1.5. Fixing objectives of the educational program documentation**

Documentation that fixes objectives of the educational program:

• Federal State Educational Standard

• Work programs of disciplines of the curriculum

• Programs of practices

• Methodological recommendations for the realization of the course and final graduation works

• Regulation on the final state certification

• Information leaflets, flyers, used for career guidance and attraction of potential applicants and business partners

**1.6. Publications objectives of the educational program**

The objectives of the educational program published and available to all users of the educational program on the web-site http://knit.bsu.edu.ru/knit/.

In addition to that, the objectives of the program are reflected and available to all consumers of the educational program in the following published materials:

- In the Federal State Educational Standard of higher education in the bachelor degree program Information and Communication Technologies and Communication Systems;

- In teaching materials of disciplines presented in the e-learning system «Pegasus» (http://pegas.bsu.edu.ru);

- In the minutes of the meeting of the Scientific and Methodological Council of the Course;

- In practices programs;

- In the final state certification statutes;

- In information booklets, leaflets used for career guidance and attraction of potential applicants and business partners.

**1.7. Mechanism for determining and reviewing objectives**

Objectives of the concentration program (CP) are formed with the requirements of the Federal State Educational Standard, labor market conjuncture, the demand for graduates, directions of Russian info-communication complex development, the requirements of potential employers for professional competence.

The Scientific and Methodological Council of the Course (SMCC) was established for definition and revisitation of the educational program objectives, which consists of teachers implementing the CP by the assignment 210700.62 Information and Communication Technologies and Communication Systems in an amount of at least 2 people from each cycle of disciplines. SMCC Chairman is DScTech, Head of Department E.G. Zhilyakov. Development and validation of concentration programs of the course are considered at meetings of SMCD. Also the ultimate goals that must be achieved in the course of training and education, and the formation of professional and personal competencies of graduates are determined. Results of SMCC reflected in the Minutes of the meeting of SMCC.

Potential employers are involved in the process of determining and revisitation of the objectives of the CP, in accordance with the requirements that are used to correct topics of course works and final graduate works, themes of laboratory and practical works on a number of disciplines are developed. As a part of the educational process, students make projects on individual technical assignments developed by representatives of potential employers.

In addition, representatives of the leading telecommunications companies in the region are included in the National Examinations and Certification commissions: Chairmen - PhD in Technical Sciences, Head of the Telecommunications Department of JSC "Medtech" P.G. Goncharenko (through 2012), PhD in Technical Sciences, Head of project engineering group of Belgorod branch of the Central Scientific-Production Association "Cascade" R.K. Davletkaliev ; Panelists: Belgorod branch of JSC "Rostelecom" director G.N. Kuz'menko, Head of telephone line support and repair center in Shebekino of Telecommunications Operation and Maintenance Center in Gubkin, Belgorod branch of JSC "Rostelecom" V.A. Shatalov.

Propositions of SMCC and partners from the sphere of real business on the definition and revisitation of program objectives are approved after consideration during the sub-faculty meeting , the Faculty Academic Council and, if necessary, by the Academic Council of the University.

**1.8. Documentation of the periodic evaluation of the achievement level of the program objectives**

Periodic level of achievement evaluation of the educational program objectives is fixed at:

-Minutes of meetings of the Academic Council of the Faculty of Information Technology and Applied Mathematics;

- Minutes of sub-faculty meetings participating in the work of the CP;

- Minutes of meetings SMCC;

- Report of the SAC Chairman;

- Minutes of the meeting of the state commission on the final certification of graduates;

- A report on self-examination of the course;

- Consistently improving versions of the curriculum of graduate training.

**2. Content of the program**

**2.1. learning Outcomes**

The training should produce results that correspond the objectives of the concentration program realization. The whole of of these results should allow the bachelor cope with professional responsibilities. Below is a list of the results indicated by the symbols R1, R2, .., and their informative wording are given.

R1- ability to demonstrate basic scientific, mathematical and engineering knowledge and understanding of scientific principles underlying the construction of information technology systems and technologies.

R2-awareness of the forefront knowledge in the field of operation of the connecting systems and communications, including an analysis of the characteristics of the processes of transmission and protection of information.

P3-readiness to apply this knowledge for defining, formulating and solving engineering problems, using appropriate methods.

P4-ability to select and apply appropriate analytical methods and methods of elements of telecommunications systems and technology engineering.

R5-ability to combine theory, practice and methods systematically in order to solve engineering problems in the process of the elements of the information and telecommunication systems and technologies designing, and to understand the sphere of their application.

P6-ability to plan and carry out experiments on processes modeling in telecommunication systems, interpret data and arrive at conclusions.

P7-preparedness to use of measuring instruments in order to control the quality of the functioning of the connecting and communications systems, including characteristics analysis of the of the processes of transmission and protection of information

P8- preparedness to effective individual work and work as a member and team leader on interdisciplinary topics.

R9- preparedness to find the necessary literature, databases and other information sources.

R10- preparedness to self-improvement of professional level based on the training and learning of literature.

P11- preparedness to work in a foreign international surrounding in the degree in.

R12- erudition, including knowledge and understanding of contemporary social and political problems.

R13- understanding of issues of health and safety, legal aspects, responsibilities for engineering practice, the impact of engineering solutions in a social context and environment.

**2.2. Duration of education and program capacity**

Standard term of learning of the educational program at full-time education is 4 years.

The total volume of the educational program in the credits is 240 c. Practice - 12 c. Final state certification - 12 c.

**2.3. Curriculum**

Table 1 "Subjects of the curriculum"

Table 2 "Academic workload in the disciplines "

Table 3 "Interrelation of outcomes and objectives of the educational program"

**2.4. Unit of Mathematical and Natural Sciences**

The volume of the unit B2 - 49 c. The most advanced courses: Physics - 10 c., Probable Models of Infocomm Processes - 4 c., Theory of Chances and Mathematical Statistics - 5 c., Higher Mathematics (specific themes) - 4 c., Calculus of Approximations; - 4 c. (27 c.)

Math courses taught to students, allow to use the knowledge gained in the process of mathematical methods for solving engineering problems.

Discipline "Mathematical Analysis" produces fundamental knowledge in the field of integral and differential notation, which are the basis of calculations of electrical circuits, modeling the processes of signal formation and processing, analysis of queuing systems, calculation of teletraffic, calculations in process of solving problems of the propagation of electromagnetic waves.

The knowledge gained in the study of the discipline Calculus of Approximations are the basis for solving the problems of signal propagation, communication theory, applied in decision-making, and others.

Mathematical knowledge gained in the study of the subject Probable Models of Infocomm Processes are a tool for solving problems of transmission and protection of information, the application of computer and information technology, analysis of connecting systems and structures of telecommunication systems.

The knowledge gained in the study of the subject Theory of Chances and mathematical statistics are the theoretical basis for solving engineering problems of optimal signal reception, generation and transmission over communication channels, teletraffic modeling and solving problems of predicting its trends, and information security tasks.

Studying of the subject Discrete Mathematics forms the knowledge to solve problems of information security and computer security of information and telecommunication systems.

**2.5. Unit of humanitarian, social and economic disciplines**

The volume of the unit B1 - 30 c.

Sufficiency of humanitarian and socio-economic preparedness is determined by the wide range of disciplines. Selection of specific disciplines is dictated by the the need to develop competence in related fields of activity of graduates. Thus, apart from the mandatory list of federal disciplines, regional disciplines unit includes: Promotion of information and communication technologies, Management in Telecommunications. Disciplines that are studied by the choice : Labour market / Labour market and search for work, History of World Religions / Religiology, Drug prevention and promotion of healthy lifestyles / Clinical Psychology, Electoral law and electoral process in the RF / Jurisprudence.

**2.6. Unit of professional disciplines**

The volume of the Unit B3 - 159 c.

Volumeof the advanced courses:

Digital Signal Processing - 5 c.; Speech Processing in Information and Telecommunication Systems - 3 c., Informatics - 11 c., Computer Science and Information Technology - 5 c .; The Theory of Electrical Circuits - 11 c., The General Theory of Communication - 9 c., Computer Security - 5 c., Fundamentals of Infocomm Systems and Networks - 5 c., Communication Networks - 9 c. , Digital Transmission Systems - 5 c. (68 c.)

**2.7. Correspondence of the level of natural science and professional preparedness**

In the process of studying of engineering disciplines the ability to apply scientific and mathematical knowledge in engineering practice is achieved. Applying the knowledge gained through the studying of natural science disciplines training in professional training unit, reflected in the table below.

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| *№ p/c* | *ЕНМ* | *Professional disciplines* |
| *1* | *Mathematical analysis* | *The general theory of communication*  *The theory of electrical circuits*  *Information Security*  *Teletraffic Theory*  *Digital signal processing*  *Speech processing in information and telecommunication systems* |
| *2* | *The theory of chances and mathematical statistics* | *The general theory of communication*  *The theory of electrical circuits*  *Information Security*  *Teletraffic Theory*  *Digital signal processing*  *Speech processing in information and telecommunication systems*  *Metrology, standardization and certification in information communications*  *Life Safety*  *Communication networks*  *Systems of electrical documentation*  *Digital transmission system*  *Electrical power supply of devices and telecommunications systems* |
| *3* | *Discrete mathematics* | *Software support for information technology in telecommunications*  *Informatics*  *Systems of electrical documentation*  *Digital transmission system*  *Network and radio system* |
| *4* | *Physics* | *Electromagnetic fields and waves*  *Electronics*  *The theory of electrical circuits*  *Circuitry of telecommunication devices*  *Metrology, standardization and certification in information communications*  *Life Safety*  *Electrical power supply of devices and telecommunications systems*  *Guiding medium of telecommunication*  *Electronics*  *Network and radio system* |
| *5* | *Calculus of approximations* | *The general theory of communication*  *The theory of electrical circuits*  *Digital signal processing*  *Speech processing in information and telecommunication systems*  *Teletraffic Theory*  *Information Security* |
| *6* | *Probable Models of Infocomm Processes* | *The general theory of communication*  *The theory of electrical circuits*  *Information Security*  *Teletraffic Theory*  *Digital signal processing*  *Speech processing in information and telecommunication systems*  *Metrology, standardization and certification in information communications*  *Life Safety*  *Communication network*  *Systems of electrical documentation*  *Digital transmission system*  *Electrical power supply of devices and telecommunications systems* |
| *7* | *Advanced Mathematics (specific themes)* | *The general theory of communication*  *Teletraffic Theory*  *Digital signal processing*  *Speech processing in information and telecommunication systems*  *Information Security* |