QUALIFICATION DESCRIPTION

PhD Program	Communication networks and systems
Educational and Scientific Degree	PhD degree, level 8 under the National Qualifications Framework
Area	5. Technical Sciences
Professional field	5.3. Communication and computer equipment
Form of education	Full time / Part-time / Self-study / Under Art. 21, para. 7 of the Higher Education Act
Duration of study	Full time up to 3 years/Part-time up to 4 years/ Self-study and Under Art. 21, para. 7 of the Higher Education Act up to 5 years
Form of graduation	Defense of PhD Thesis

OBJECTIVES OF THE TRAINING

The doctoral program "Communication Networks and Systems" aims to prepare highly qualified specialists in the field of modern communication technologies who can apply their knowledge and skills in various scientific and applied fields. The program emphasises the development of research skills, critical thinking, and the ability to solve complex problems through the application of innovative, analytical, and experimental methods and techniques.

Objectives of the doctoral program.

- Creation of highly qualified specialists with experience in experimental and theoretical activities in the field of modern communication technologies, network security, digital systems and modern wireless and optical networks, providing freedom in study and research, according to their individual interests.
- Integration of research and training of PhD students by generating, expanding and applying new knowledge and innovative scientific products with market value.
- Consistent development of academic activities following international quality standards in the training of PhD students.
- Stimulation of the academic initiative and scientific potential of IICT for the implementation of projects and research, in line with new market needs and the dynamics of a changing environment.

CONTENT OF THE TRAINING

The PhD program in "Communication Networks and Systems" has been developed following the requirements and provisions of the Higher Education Act, the Regulations on the Terms and Conditions for the Acquisition of Scientific Degrees and Academic Positions at the Bulgarian Academy of Sciences and the Regulations on the Specific Conditions for Acquiring Scientific Degrees and for Occupying Academic Positions at IICT-BAS. The discussion and adoption took place at a meeting of the Scientific Council of the Institute. The training of doctoral students is conducted according to an individual educational plan following the chosen topic of the dissertation. In the individual plan, according to the doctoral program, the mandatory

for the doctoral student is noted in detail in general, language, IT and specialized courses, scientific research (literature research, empirical research), approbation of the results on the topic of the dissertation (participation in doctoral and scientific forums, publications in reputable journals), etc. Doctoral students submit an annual attestation of the work done according to their individual plan and, if necessary, its update. The yearly attestation of each PhD student is discussed and adopted at a meeting of the National Assembly of the Institute. According to the Law on Dissertations, full-time PhD students also submit quarterly reports on the work carried out on the dissertation.

KNOWLEDGE, SKILLS AND PROFESSIONAL COMPETENCES

Basic competencies consisting of:

- in-depth knowledge of theories, concepts, principles and models related to sciences in the field of communication networks and systems, information and communication technologies, digital signal processing, network security and modern computer architectures;
- Knowledge of optimization techniques and mathematical models – linear and nonlinear programming, probabilistic processes;
- knowledge of the application of intelligent optimization and automation algorithms;
- research skills in conducting scientific experiments, critical analysis of literature, benchmarking and choosing an appropriate solution from among alternative solutions;
- skills to propose new concepts, principles, models for solving a specific problem;
- skills related to modeling and simulation of network architectures, working with specialized software, development of hardware and software solutions;
- Skills related to the assessment and analysis of network performance and working with large volumes of data, including analysis, visualization and interpretation of results.

Scientific and specialized competencies (in the scientific field) – presenting knowledge and skills necessary for the dissertation research:

- carrying out research in the field of communication networks and systems, information and communication technologies;
- independent formulation and conduct of interdisciplinary research;
- formulating, preparing proposals and managing research projects and resources in the field of communication networks;
- strategic decision-making related to innovations in communication technologies;
- dissemination of the acquired knowledge in the form of publications.

Additional skills:

- ability to work effectively in scientific teams and improve organizational skills;
- showing interest in current technological trends and innovations, as well as striving for continuous professional growth and self-improvement;
- Good presentation skills.

In addition to the acquisition of specific knowledge, emphasis is placed on the development of skills such as working with specialized literature (including in a foreign language), systematizing, summarizing and analyzing existing concepts, independent conduct of scientific and applied research, as well as clear, logical and precise presentation of the results.

The dissertation topics are based on real-world problems arising from the business's needs. PhD students are encouraged to focus their research on promising areas corresponding to the

public needs and priorities of the country, and this contributes to their successful professional realization after completing the educational and scientific degree.

PROFESSIONAL REALIZATION

This program is aimed at creating new knowledge and its application in practice, preparing PhD students for leading roles in academia, research institutions and the high-tech sector. Possible positions or positions held in:

- Academic and research community;
- Telecommunications sector;
- IT sector;
- Cybersecurity and data protection;
- Industry and IoT (Internet of Things) technologies;
- State and international institutions.

The knowledge and skills acquired during the training enable graduates to realize themselves in research, production, implementation and design departments aimed at increasing the efficiency of existing and innovative productions. The program provides training for solving complex scientific problems, managing design, technological and scientific teams, as well as teaching activities in higher education institutions.

After completing this program, doctors can pursue further studies in postdoctoral programs in the country or abroad.

The Scientific Council of IICT-BAS approves the Qualification description on 26.3.2025 (Record № 3).

Approved by:

corr. mem. Sv. Margenov