QUALIFICATION DESCRIPTION

This qualification defines the knowledge, skills, personal and professional competences of the Ph.D. students who have studied and graduated from the Ph.D. programme Computer Science.

I. ANNOTATION OF THE PROGRAMME

The Ph.D. programme prepares highly qualified scientists in the field of computer science who possess the knowledge and skills to solve complex problems of a scientific and applied nature. The training and research activities in the Ph.D. programme contribute to the production of new results in key areas of fundamental and applied knowledge in computer science and information technology, such as:

- Computability theory: computability and complexity of formal languages;
- Algorithms and data structures: design and study of fast algorithms, correctness and complexity analysis of algorithms and mathematical tools for this analysis, data structures, algorithmic schemes;
- Machine learning: statistical methods for machine self-learning, neural networks and deep learning, ensemble learning, information extraction, knowledge discovery in data;
- High-performance computing: parallel and distributed processing computer architectures, superscalar and vector processors, pipelined and superconveyor architectures, parallel programming, distributed software architectures, distributed communication systems;
- Coding theory: theoretical foundations of cryptography, compression, information transmission in insecure communication environments;
- Programming language theory: types of programming languages, specification methods and implementation of programming languages;
- Formal methods: formal mathematical methods for specification and verification of software and hardware systems;
- Computer networks: network architectures and protocols, optimization of computer network topologies, search for optimal paths and load distribution in computer networks, protection of network communications, network programming;
- Software architectures: advanced concepts and formal research methods in software architectures and technologies, enterprise architectures, business models.

Ph.D. students will form skills for planning and conducting research and analyzing its results. The curriculum corresponds to the European Qualifications Framework, which gives full comparability of qualifications with those in different countries and from different EU training systems.

The training is carried out mainly by the teaching staff of the Computer Informatics and Software Technologies Departments in close cooperation with all the colleagues of the Faculty of Informatics and in collaboration with other research organizations in the country and in the EU, as well as with leading companies - developers of software systems. Ph.D. students participate in the research and teaching activities of the FMI, receiving real feedback on their achievements during the annual national and international scientific forums.

The admission and training of doctoral students is in accordance with the legal requirements of:
- Higher Education Act;
- Act for the Development of the Academic Staff in the Republic of Bulgaria;
- Regulations on the implementation of the Development of Academic Staff in the Republic of Bulgaria Act;
- The Rules on the Conditions and Procedure for Acquiring Science Degrees and Holding Academic Positions in Sofia University “St. Kliment Ohridski”

The training is of the following duration:
- 3 years of full-time study;
- 4 years in part-time form of study;
- up to 5 years of self-study.

The PhD programme Computer Science provides an opportunity to acquire the educational and scientific degree "Doctor of Philosophy" in professional field 4.6 Informatics and Computer Science after:
- successful completion of all phases of the Ph.D. student's individual plan;
- successful defence of the thesis.

The training may be carried out in Bulgarian or in English, according to the candidate's preferences.The language of training is determined at the time of admission of the candidate and is not subject of change.

The main aims and objectives of the Ph.D. programme in Computer Science are:
- to provide training for Ph.D. students (in Bulgarian or in English) aimed at acquiring, broadening and deepening theoretical knowledge and abilities for research of current problems, following the trends in the development of the scientific field;
- to impose high standards for the conduct of scientific research in the professional field and in particular in the scientific topics of the doctoral programme, using modern research methods, tools and techniques;
- provide opportunities for doctoral students to produce independent and collaborative publications;
- to provide opportunities for Ph.D. students to participate in multidisciplinary teams of scientific and applied research projects carried out by members of the departments, under national and international programmes;
- to ensure that each Ph.D. student is consulted during the process of developing the thesis by the supervisor, members of the academic staff of the host unit;
- to provide opportunities for mobility of PhD students through the development of scientific cooperation with other higher education institutions and scientific organizations in the country and abroad;
- to provide opportunities for the acquisition of skills and experience for teaching within the current curricula of the FMI;
- to prepare highly qualified personnel with in-depth fundamental training and professional competence for research, practical-applied, expert and teaching activities in the field of computer science and its applications, carried out both independently and in a team, by creating skills for planning and organizing scientific and applied research and for presenting the results obtained.

In addition, the Ph.D. programme Computer Science
- sets high standards for the conduct of research;
- provides opportunities for Ph.D. students to produce independent and joint publications, participate in conferences and projects under national and international programmes;
- provides mobility through the development of scientific cooperation;
- provides opportunities for acquiring skills and experience in teaching.

The training in the doctoral programme Computer Science is in full compliance with the mission and goals of the FMI, in sync with the Strategy for Scientific Development of the SU and in particular with the goals set by the FMI-SU for the preservation and development of scientific capacity in the field of fundamental research in informatics and information technologies; the transformation of this capacity into a basis for applications in other areas of mathematics, informatics and in those natural and social sciences whose modern development is based on the increasing use of information technology.

II. EXPECTED RESULTS AND COMPETENCES

As a result of the successful passing the full course of study offered in the Ph.D. programme Computer Science, the Ph.D. students are expected to acquire the following knowledge, skills and competences:

- knowledge of the current state of the scientific field, the contemporal problems and development trends in the field and in its applications;
- highly specialized knowledge on problems specific for the field of the dissertation;
- skills for independent study and knowledge acquisition, as well as ability to generate new ideas in solving educational, research and practical problems, including in interdisciplinary areas;
- skills for planning and accomplishment of scientific and applied tasks in a timely manner;
- skills in clearly formulating problems, proposing solutions, expressing, justifying and defending scientific theses and ideas, and choosing appropriate approaches and methods;
- skills to carry out comprehensive scientific research;
- skills to write scientific publications in accordance with the criteria of international scientific journals, both in Bulgarian and foreign languages, as well as to present their results in scientific communications at national and international scientific forums;
- analytical, critical and systematic thinking skills;
- competences for effective use of bibliographic information, operation with specialised sources of information, use of specialised mathematical software tools;
- competences to teach courses at FMI;
- personal competences to work in research teams and manage research projects.

III. REALISATION

Graduates of the Computer Science Ph.D. programme are highly trained professionals who can pursue careers as:

- teachers in higher schools and schools for extracurricular work with students with special interests in the field of informatics and computer science; teachers of subjects for specialized training in informatics in the second secondary school stage;
- researchers in scientific institutes, organizations and laboratories;
- heads of departments developing innovative information and communication technologies;
- systems analysts and software system designers;
- business analysts;
- leaders or team members of national or international research or applied science projects;
- consultants or participants in the development of products and programmes of an educational nature, including those for the needs of state and public structures;
- project evaluators in the field of informatics and computer science, design and development of reliable and efficient software systems, etc.

Graduates of the Ph.D. programme can:

- participate in various forms of continuing education (postdoctoral programmes);
- participate in competitions for academic positions and/or other degrees.