QUALIFICATION DESCRIPTION

This qualification defines the knowledge, skills, personal and professional competences of the PhD students who have studied and graduated from the PhD programme Computational Mathematics.

I. ANNOTATION OF THE PROGRAMME

Training in the Ph.D. programme is aimed at developing scientists with high-level research and teaching skills. During their studies, Ph.D. students acquire solid knowledge in their chosen subfield of computational mathematics - a classical and, at the same time, a modern, rapidly developing branch of applied mathematics.

The main sub-fields of computational mathematics on which the training in the Ph.D. programme is focused are numerical analysis, approximations of functions and functionals, extremal problems for polynomials and spline functions, and multivariate approximations, depending on the specific interests and desire of the Ph.D. students for the research part of their PhD. In addition to the theoretical areas listed above, Ph.D. students can gain knowledge and research skills in other applied areas such as numerical methods, mathematical modeling in biology, physics, mechanics, and others. Doctoral students develop skills in planning and conducting scientific research and analysing the results. The curriculum complies with the European Qualifications Framework, which gives full comparability of qualifications with those in different countries and from different training systems in the EU. The training is carried out by the teaching staff of the Department of Numerical Methods and Algorithms in close collaboration with all colleagues of the FMI and in cooperation with other research organisations in the country and in the EU.

During their studies, Ph.D. students become part of the academic community of the Faculty of Mathematics and Informatics and work in direct contact with researchers in the field of computational mathematics. This is done through their active participation in seminars, national and international schools and conferences, and through informal discussions. In this way, they are directly informed about the current state of research in their field, get ideas for new directions in their work and promote their results worldwide and at home. Additional advantages are joining high level working groups and encouraging teamwork.

The admission and training of doctoral students is in accordance with the legal requirements of:
- Higher Education Act;
- the Law on the Development of Academic Staff in the Republic of Bulgaria;
- The Regulations for the Implementation of the Law on the Development of Academic Staff in the Republic of Bulgaria;
- The Regulations on the Conditions and Procedure for Acquisition of Scientific Degrees and Occupation of Academic Positions at Sofia University "St. Kliment Ohridski". Rules of Procedure for the Conditions of Academic Degrees in the Republic of Bulgaria.

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 Ph.D. programme Computational Mathematics provides an opportunity to acquire the educational and scientific degree "Doctor of Philosophy" in professional field 4.5 Mathematics after:
- successful completion of all phases of the doctoral 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 Computational Mathematics are:
- knowledge of the current state, research problems and development trends in the field of numerical analysis, approximations of functions and functionals, extremal problems for polynomials and spline functions, and multivariate approximations;
- highly specialized knowledge of specific problems addressed in the dissertation;
- skills for independent learning and knowledge acquisition, as well as the ability to generate new ideas in solving educational, research and practical problems, including in interdisciplinary areas;
- skills for planning and execution of scientific and applied tasks in a timely manner
- skills in clearly formulating problems; proposing solutions; expressing, justifying and defending scientific theses and ideas; selecting appropriate different approaches and methods;
- skills in carrying out comprehensive scientific research;
- skills in producing scientific texts in Bulgarian and foreign languages in accordance with the criteria of international scientific publications and in presenting their results in scientific communications at national and international scientific forums;
- analytical, critical and systematic thinking skills;
- competences for the effective use of bibliographic information; for working with specialised sources of information; for working with specialised mathematical software tools when necessary;
- competences for teaching courses offered and conducted by the Department of Numerical Methods and Algorithms;
- personal competences for working in research teams and managing research projects.

The training in the Ph.D. programme Computational Mathematics is in full compliance with the mission and the vision of the FMI and in line with the Scientific Development Strategy of the SU. In particular the training is in compliance with the goals set by the FMI-SU:
- to preserve and develop the scientific capacity in the field of fundamental research in mathematics and informatics;
- to transform this capacity into a basis for applications in other areas of mathematics, computer science and natural and social sciences whose modern development relies on the increasing use of algebraic and arithmetical methods;
- to preserve and develop long-standing traditions in the discovery and development of young talents in mathematics and computer science in order to build the next generation of teachers and researchers.

II. EXPECTED RESULTS AND COMPETENCES

As a result of the successful passing the full course of study offered in the Ph.D. programme Computational Mathematics, 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 conducted by the Department of Numerical methods and algorithms;
- personal competences to work in research teams and manage research projects.

III. REALISATION

Graduates of the Ph.D. programme Computational Mathematics are highly prepared specialists who can be realized as:
- lecturers in universities, higher schools, schools for extracurricular work with students with outstanding interests in mathematics;
- researchers in scientific institutes, organizations and laboratories;
- leaders or team members working on national or international research or applied science projects;
- consultants or participants in the development of products and programmes of an educational nature, including for the needs of government and public bodies;
- project evaluators in the field of approximation theory, numerical analysis and their applications in other areas of mathematics, in natural sciences and in various areas of mathematical informatics.

Graduates of the Ph.D. programme can:
- participate in various forms of continuing education (postdoctoral programs);
- participate in competitions for academic positions and/or other degrees.