Educational plan

PhD program "Computational Mathematics"

First year (1-2 semester)

1. **Language Preparation Course**

2. **Computer Skills Course – Choice of** IT Courses
   - LaTeX Basics
   - Data Analysis with R
   - Presentation skills
   - Photoshop
   - GIMP
   - MATLAB
   - Statistical data analysis
   - MS Excel
   - Transfer of scientific knowledge to the public through the free electronic encyclopedia Wikipedia

3. **Individual Research Plan 1**

   - Formulation of a research topic

   - Literature review and methodological preparation

   - Initial results and analyses

4. **Specialized courses – selection of at least two courses from** Specialized courses **at the Central Center of the Bulgarian Academy of Sciences**

   - *Numerical solution methods for systems with sparse matrices*, Lecturer, Corresponding Member Svetozar Margenov

   - *Introduction to parallel computing*, lecturer Prof. Todor Gyurov

   - *Distributed computations*, lecturer Prof. Emanuil Atanasov

   - *Machine Learning and Data Pattern Extraction*, lecturer Prof. Maria Nisheva-Pavlova at FMI-SU

5. **Seminar on Scientific Calculations**
   - Presentation and discussion of current research and projects

   - Critical analysis of scientific articles and reports

6. **General basic preparation according to the synopsis for an exam in a basic specialized subject**

   - Preparation of a synopsis on the topic of the dissertation

   - Synopsis exam: 2 written questions and 2 - 4 oral questions

Second year (3-4 semester)

7. **Individual Research Plan 2**

   - Research and experiments

   - Analysis and interpretation of results

   - Preparation of a dissertation

8. **Ethics and professional development**

   - Scientific ethics and integrity

   - Publication of scientific papers

   - Participation in conferences and seminars

   - Career development and academic opportunities

9. **Seminar on Scientific Calculations 2**

   - Presentation and discussion of individual research projects

   - Interdisciplinary discussions and collaboration

Third year (5-6 semester) (for PhD students, part-time and self-study until the end of the doctoral period)

10. **Individual Research Plan 3**

    - Finalizing research and experiments

    - Analysis and interpretation of results

    - Preparation of a dissertation

11. **Publications and presentations**

    - Preparation of scientific articles for publication

    - Presentation of the results of international conferences

12. **Presentation of the work done on the dissertation**

    - Presentation of published results

- Further specification of the topic of the dissertation (no later than 3 months before the date of the meeting of the section for the preliminary discussion)

13. Defense of the dissertation (up to 5 years after the expiration of the doctoral degree)

- Preparation and presentation of the dissertation to a scientific jury.

- Answers to questions and criticism from committee members

This program equips PhD students with the necessary knowledge and skills to conduct independent research in the fields of mathematics (main subfields include numerical analysis, approximation theory, extreme problems for polynomials and rational functions), biomathematics, mathematical physics, mechanics, and their successful application in various scientific and practical contexts.