Educational plan

PhD program "Mathematical Modelling and Application of 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. **Specialized courses – selection of at least 2 courses from Specialized courses at the Central Office of the Bulgarian Academy of Sciences**

    1. CLOUD TECHNOLOGIES
    2. PARALLEL PROGRAMMING
    3. INTRODUCTION TO THE PROCESS OF KNOWLEDGE DISCOVERY
    4. TECHNOLOGIES AND SERVICES IN DIGITAL CONTENT MANAGEMENT SYSTEMS
    5. FUNDAMENTALS OF THE BRAIN-COMPUTER INTERFACE
    6. DISTRIBUTED CALCULATIONS
    7. DESIGNING INTERNET APPLICATIONS
    8. ADVANCED SENSOR INFORMATION PROCESSING
    9. INTERNET TECHNOLOGIES FOR SYSTEM MANAGEMENT
    10. INTRODUCTION TO PARALLEL COMPUTING

11. OPTIMIZATION METHODS

12. MATHEMATICAL FOUNDATIONS OF NEUROBIOLOGY

4. **Individual Research Plan 1**
    - Formulation of a research topic
    - Literature review and methodological preparation
    - Initial results and analyses

5. **Seminar on Mathematical Modelling and Application of Mathematics 1**
    - 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. **Ethics and professional development**
    - Scientific ethics and integrity
    - Publication of scientific papers
    - Participation in conferences and seminars
    - Career development and academic opportunities

8. **Seminar on Mathematical Modelling and Application of Mathematics 2**
    - Presentation and discussion of individual research projects
    - Interdisciplinary discussions and collaboration

9. **Individual Research Plan 2**
    - Research and experiments
    - Analysis and interpretation of results
    - Preparation of a dissertation

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 provides PhD students with the necessary knowledge and skills to conduct independent research in the field of mathematical modelling and its successful application in various scientific and practical contexts.