

Institute of Physics

Bachelor Program: "Applied mathematics and computer science"

Field of Studies: "Mathematical modelling and computational mathematics"

Years of studies: 4

Language of instruction: Russian

| <b>№</b> | <b>Subject</b>                                    | <b>Hours</b> | <b>Credits</b> |
|----------|---|--------------|----------------|
|          | <b>Compulsory courses<br/>Block1</b>              |              |                |
|          | <b>Block 1 Disciplines<br/>(modules)</b>          |              |                |
|          | <b>Basic part</b>                                 |              |                |
| 1.1      | History   | 144          | 4              |
| 1.2      | Philosophy  | 108          | 3              |
| 1.3      | Foreign language                                  | 288          | 8              |
| 1.4      | Economics   | 108          | 3              |
| 1.5      | Mathematical Analysis                             | 504          | 14             |
| 1.6      | Algebra and geometry                              | 288          | 8              |
| 1.7      | Complex analysis                                  | 108          | 3              |
| 1.8      | Functional Analysis                               | 108          | 3              |
| 1.9      | Information Technologies                          | 108          | 3              |
| 1.10     | Mathematical Logic and Set Theory                 | 216          | 6              |
| 1.11     | Computer Architecture                             | 108          | 3              |
| 1.12     | Discrete Mathematics                              | 180          | 5              |
| 1.13     | Physics   | 216          | 6              |
| 1.14     | Computer Graphics                                 | 108          | 3              |
| 1.15     | Differential Equations                            | 288          | 8              |
| 1.16     | Probability Theory and Mathematical Statistics    | 288          | 8              |
| 1.17     | Operating Systems                                 | 180          | 5              |
| 1.18     | Programming Languages and Methods                 | 180          | 5              |
| 1.19     | Mathematical Physics                              | 144          | 4              |
| 1.20     | Equations   | 144          | 4              |
| 1.21     | Numerical Methods                                 | 360          | 10             |
| 1.22     | Databases   | 144          | 4              |
| 1.23     | Optimization methods                              | 144          | 4              |
| 1.24     | Mathematical Modelling in C#                      | 144          | 4              |
| 1.25     | Psychology  | 108          | 3              |
| 1.26     | Fundamentals of cybernetics and discrete modeling | 144          | 4              |
| 1.27     | Plasticity theory                                 | 108          | 3              |
| 1.28     | Nonlinear shell mechanics                         | 108          | 3              |
| 1.29     | Life safety                                       | 108          | 3              |
| 1.30     | Physical Education and                            | 72           | 2              |

|          |   |             |            |
|----------|---|-------------|------------|
|          | Sports  |             |            |
|          | <b>TOTAL for the basic part</b>                             | <b>5112</b> | <b>142</b> |
| <b>2</b> | <b>Variative part</b>                                       |             |            |
| 2.1      | Rule of Law: History and Modernity                          | 72          | 2          |
| 2.2      | Foreign language for professional communication             | 144         | 4          |
| 2.3      | Physics of wave processes                                   | 72          | 2          |
| 2.4      | Integral equations  | 144         | 4          |
| 2.5      | Basics of scientific and educational literature preparation | 72          | 2          |
| 2.6      | Fundamentals of Mathcad programming                         | 72          | 2          |
| 2.7      | Additional chapters on partial differential equations       | 144         | 4          |
| 2.8      | Nonlinear differential equations                            | 216         | 6          |
| 2.9      | Using MatLab for solving mathematical modelling problems    | 144         | 4          |
| 2.10     | LaTeX publishing system                                     | 72          | 2          |
| 2.11     | Boundary value problems and calculus of variations          | 72          | 2          |
| 2.12     | Game Theory and Operations Research                         | 108         | 3          |
| 2.13     | Modern Simulation Problems                                  | 72          | 2          |
|          | <b>Elective disciplines</b>                                 |             |            |
| 3        | Philosophical Problems of Mathematics                       | 72          | 2          |
| 3.1      | Philosophy of Science and Technology                        | 72          | 2          |
| 3.2      | Telecommunication Network and System Architecture           | 108         | 3          |
| 3.3      | Modern Computer Technologies                                | 108         | 3          |
| 3.4      | Parallel data processing                                    | 108         | 3          |
| 3.5      | Models and methods for digital signal processing            | 108         | 3          |
| 3.6      | Spectral theory of linear operators                         | 108         | 3          |
| 3.7      | Banach algebras and spectral theory                         | 108         | 3          |
|          | Vector Analysis   | 108         | 3          |
| 3.8      | Vector Analysis   | 108         | 3          |
| 3.9      | Fluctuations in Mechanical Systems                          | 108         | 3          |
| 3.10     | Applications of Analytical Functions in Mathematical        | 144         | 4          |

|      |  |      |     |
|------|--|------|-----|
|      | Modelling  |      |     |
| 3.11 | Operations Research Methods                                    | 144  | 4   |
| 3.12 | Problems of Chaos and Nonlinearity                             | 108  | 3   |
| 3.13 | Vibration Synchronization                                      | 108  | 3   |
| 3.14 | Gaming Sports  | 328  |     |
| 3.15 | Recreational physical culture                                  | 328  |     |
|      | <b>Total for the variative part</b>                            | 2268 | 65  |
|      | <b>Total for Block B.1</b>                                     | 7780 | 207 |
|      | <b>Block 2 Practices</b>                                       |      |     |
|      | <b>Practices (variable part)</b>                               | 648  | 18  |
|      | Educational (technological) internship                         | 108  | 3   |
|      | 2nd internship* 2nd pedagogical practice                       | 108  | 3   |
|      | Work practice**  | 108  | 3   |
|      | Work practice (Research)                                       | 108  | 3   |
|      | Work Practice (Pre-diploma)                                    | 216  | 6   |
|      | <b>Block 3 State Final Attestation</b>                         |      |     |
|      | State Final Assessment (basic part)                            | 216  | 6   |
|      | Preparation for defense and defense of Master's and PhD theses | 216  | 6   |
|      | <b>TOTAL on direction</b>                                      | 8968 | 240 |
|      | <b>Elective courses</b>  |      |     |
|      | Multiphysics programming in the ANSYS environment              | 72   |     |
|      | Programming in Mathcad   | 108  |     |
|      | Military training 01 (final certification)                     | /843 |     |