**Curriculum**

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| --- | --- |
| **Program** | MA Program “Mathematics” |
| **Degree awarded** | Master in Mathematics 0501 |
| **Faculty**  | Faculty of Exact and Natural Sciences |
| **Program coordinator/coordinators** | Professor Giorgi Oniani |
| **Length of the program (semester, ECTS)** | 120 ECTS, 4 semesters |
| **Language of the Program**  | Georgian |
| **Program development and renewal date of issue** | **Accreditation Decision** **№69; 6.04.2012**Board Protocol No. 7 (25.04.2011) of the meeting of Faculty of Exact and Natural Sciences, Academic Board decision №1 (11/12) 31.08.2011.Faculty Board protocol №8 ,24.05.2012Academic Board protocol №17 ,25.05.2012The Physics Department protocol № 5 22.01.2014, protocol №7 16.05.2014Faculty Board protocol №3,16.05.2014Faculty Board protocol №12,15.06.2016University Academic Board decision №2 (15/16)22.09.2016Faculty Board protocol №1,11.09.2017University Academic Board decision №1 (17/18)15.09.2017 |
| **Program prerequisites :** |
| * Bachelor's academic degree,
* Passing the Unified Master’s Level Exam,
* Passing the university internal exam in Mathematics,
* Successfully completing the competion while enrolling in the program .
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|  **Aim of the Program**  |
| * To give deep and systematic knowledge of mathematics;
* To develop essential skills necessary for managing independently high-level professional activities and scientific research;
 |
| **Learning outcomes (the map of competences)** |
| **Knowledge and understanding:** | * + - Deep and systemic knowledge of Mathematics that create the basis for the

solution of complex tasks and the development of new, original ideas within the chosen specialization;* Deep knowledge of the aspects of interrelationships between the development of e-business Mathematics and its fields;
* Knowledge of teaching and learning process of mathematics;
* Knowledge of foreign language in order to provide written and oral communication with specialists.
 |
| **Applying knowledge:** | * Ability to use mathematical theories and methods to overcome complicated and complex tasks;
* Ability to get acquinted with scientific literature and the latest researches independently;
 |
| **Making judgement:** | * Ability to understand and abstract the difficult problems;
* Ability to formulate grounded conclusions based on critical analysis of complex and incomplete information (including recent researches).
 |
| **Communication skills:** | * Ability to demonstrate clearly the results of conclusions, arguments and researches to specialists in Georgian and foreign languages both in oral and written forms;
* Ability to use modern informative and communicative technologies from different sources for the purpose of finding, processing and presenting the information;
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| **Learning skills:** | * Ability to study and independently manage classical and recent achievements of research;
 |
| **Values:** | * Accepting the standards of academic honesty;
* Ability to evaluate his/her professional values and others' attitudes.
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| **Teaching methods:** |
| Classical methods of teaching are: inductive, deductive, analysis and synthesis, verbal explanatory, writing, heuristic, demonstrative; Case-techniques: Situational analysis, situational tasks and exercises, case-study analysis; Action-oriented teaching and more. |
|  **Structure of the Program:** |
| The duration of the program is 120 credits, which are distributed as follows:• **Study component (95 credits):** Compulsory courses (50 credits), optional module of specialty (35 credits), optional courses (10 credits)**• Research component (25 credits):** Master's thesisThe program includes two elective modules of specialization: "Theory of functions" and "Differential equations".**See the attached document 1** |
| **Assessment System** |
| The final assessments are made on the basis of summarizing the evaluation of intermediate and the final exam.Maximum assessment of the course is equal to 100 points.The student has the right to take the final exam, if his/her minimum competency is 18 points. A student with less than 15 points on the final examination, despite its achievements in other components of the assessment, can be evaluated by FX (failed).Evaluation System includes: **A. Five Forms of Positive Assessment:**  (A) Excellent – 91-100 points  (B) very good – 81-90 points (C) good – 71-80 points (D) satisfactory – 61-70 points (E) sufficient – 51-60 points**B. Two Forms of Negative Assessment:** B.(FX) (Administrative Fail in Course for Grade/could not pass)– A student gets 41-50 points from maximum evaluation which means that s/he is required to work more for passing the exam, and that s/he is entitled to take a makeup exam only once through personal study;(F) (Academic Fail) – A student gets 0-40 points and less from maximum evaluation which means that the work done by him/her is not sufficient and s/he has to retake the course.According to educational component of educational program, in case of adoption of FX, a makeup exam will be appointed no less than 5 calendar days after the conclusion of the final exam results. The number of points received in the makeup final exam, is not added to the final assessment received by the student. According to the assessment 0-50 points received from the makeup final exam, in the final evaluation of the educational component, the student will be evaluated the F-0 score.Concrete criteria of assessments are defined into the corresponding syllabus of an academic course. |
|  **Employment opportunities:** |
|  The master's degree in mathematics is an essential prerequisite for employment in all areas in which they require deep and systemic knowledge of mathematics, complex mathematical methods and logical thinking. Main potential working areas of graduates are: education, science, business, banking and financial structures, administrative activities. |
| **Supportive resources:** |
| See the attached documents 3.1-3.16 |
|  |

**Attached document 1**

**General description of the program structure**

|  |  |  |
| --- | --- | --- |
| **Components and subcomponents** | **ECTS****Quantity** | **Semester** |
| **I** | **II** | **III** | **IV** |
| **Teaching** | **95** | **30** | **30** | **15** | **10** |
| **1.1** | Compulsory courses | 50 | 30 | 15 | 5 |  |
| **1.2** | Optional module of Specialty | 35 |  | 10 | 15 | 10 |
| **1.3** | Optional courses | 10 |  | 5 | 5 |  |
| **Research component** | **25** |  |  |  | **25** |
| **2.1** | Master’s Thesis | 25 |  |  |  | 25 |
| **Total** | **120** | **30** | **30** | **25** | **35** |

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 **Attached document 1**

**Study Schedule of 2017-2019 years**

**Program: Mathematics**

**Degree Awarded: Master in Mathematics**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| № | Course | Contact hours in week | Credits | The number of hours | Lecture/Practical/Laboratory/Seminar | Semester | Preconditions |
| Total | Contact hours | Independent | I | II | III | IV |
| Class hours | Midterm and final exams |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 1 |  **Compulsory Courses of Specialty (50ECTS)** |
| 1.1 | Functional analysis -1 | 3 | 5 | 125 | 45 | 3 | 77 | 2/0/0/1 | **5** |  |  |  | - |
| 1.2 | Functional analysis -2 | 3 | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 |  | **5** |  |  | 1.1 |
| 1.3 | True analysis | 3 | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 |  | **5** |  |  | - |
| 1.4 | Algebra -1 | 3 | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 | **5** |  |  |  | - |
| 1.5 | Geometry | 3 | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 | **5** |  |  |  | - |
| 1.6 | Normal Differential Equations | 3 | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 | **5** |  |  |  | - |
| 1.7 | Partial Differential Equations | 3 | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 | **5** |  |  |  | - |
| 1.8 | Discrete mathematics | 3 | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 | **5** |  |  |  | - |
| 1.9 | Probability theory | 3 | 5 | 125 | 45 | 3 | 77 | 2/0/0/1 |  |  | **5** |  | - |
| 1.10 | Numerical analysis -1 | 3 | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 |  | **5** |  |  | - |
| **Total:** |  |  |  |  |  |  |  |
| 2 | **Optional Module of Specialty 1: Theory of Functions(35 ECTS)** |
| 2.1 | Fourier analysis -1 | **3** | 5 | 125 | 45 | 3 | 77 | 0/0/0/3 |  | **5** |  |  | - |
| 2.2 | Fourier analysis -2 | **3** | 5 | 125 | 45 | 3 | 77 | 0/0/0/3 |  |  | **5** |  | 2.1 |
| 2.3 | Fourier analysis -3 | **3** | 5 | 125 | 45 | 3 | 77 | 0/0/0/3 |  |  |  | **5** | 2.2 |
| 2.4 | Differentiation of Lebesgue Integrals -1 | **3** | 5 | 125 | 45 | 3 | 77 | 0/0/0/3 |  | **5** |  |  | - |
| 2.5 | Differentiation of Lebesgue Integrals -2 | **3** | 5 | 125 | 45 | 3 | 77 | 0/0/0/3 |  |  | **5** |  | 2.4 |
| 2.6 | Differentiation of Lebesgue Integrals -3 | **3** | 5 | 125 | 45 | 3 | 77 | 0/0/0/3 |  |  |  | **5** | 2.5 |
| 2.7 |  Border features of analytic and harmonic functions | **3** | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 |  |  | **5** |  | - |
| 3 |  **Selective Module of Specialty 2: Differential Equations (35ECTS)** |
| 3.1 | Border tasks of Analytic Function Theory -1 | **3** | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 |  | **5** |  |  | - |
| 3.2 | Border tasks of Analytic Function Theory- 2 | **3** | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 |  |  | **5** |  | 3.1 |
| 3.3 | Border tasks of Analytic Function Theory -3 | **3** | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 |  |  |  | **5** | 3.2 |
| 3.4 | Hyperbolic and Parabolic equations | **3** | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 |  | **5** |  |  | - |
| 3.5 | Pseudo-differential equations | **3** | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 |  |  | **5** |  | - |
| 3.6 | Optimal Management Theory -1 | **3** | 5 | 125 | 45 | 3 | 77 | 2/0/0/1 |  |  | **5** |  | - |
| 3.7 | Optimal Management Theory -2 | **3** | 5 | 125 | 45 | 3 | 77 | 2/0/0/1 |  |  |  | **5** | 3.6 |
| **Optional Courses(10 ECTS)** |
| 4 | **Optional Course -1** |  |  |  |  |  |  |  |  | **5** |  |  |  |
| 4.1 | Field related English Language-1  | **3** | 5 | 125 | 45 | 3 | 77 | 0/3/0/0 |  |  |  |  | - |
| 4.2 | Algebra-2 | **3** | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 |  |  |  |  | 1.4 |
| 5 | **Optional Course – 2** |  |  |  |  |  |  |  |  |  | **5** |  |  |
| 5.1 | Field related English Language -2 | **3** | 5 | 125 | 45 | 3 | 77 | 0/3/0/0 |  |  |  |  | 4.1 |
| 5.2 | Metric properties of the functions of many variables  | **3** | 5 | 125 | 45 | 3 | 77 | 1/0/0/2 |  |  |  |  | - |
| 5.3 | Numeric analysis -2 | **3** | 5 | 125 | 45 | 3 | 77 | 0/0/0/3 |  |  |  |  | 1.10 |
| **Total:** | **-** |  |  |  |  |  |  |  |  |  |  |  |
|  | ***Note****: The student chooses among 5.1,5.2 and 5.3 in case of Optional Course-2 .Moreover, while choosing between 5.2 and 5. 3 courses 5.2 complies with the optional module “Theory of Functions”, and 5.3 –“Differential Equations”.* |
| 6. | **Master’s Thesis** |  | **25** |  |  |  |  |  | **25** | - |
|  |  | **-** |  | **750** |  |
| **Total:** |  | **120** | **3000** |  |  |  |  |
|  |  |  |  |  |  |  |  |  | **30** | **30** | **25** | **35** |  |