

QUALIFICATION CHARACTERISTIC

of

“TECHNOLOGY OF TEACHING MATHEMATICS AND INFORMATICS” Master’s degree programme

in 1.3. “Pedagogy of Education in...” vocational area

“Teacher in Mathematics, Informatics and Information Technology” Vocational Qualification

1 school year (2 semester)

Vocational Qualification and Competences Requirements for Students Candidates

In “Technology of Teaching Mathematics and Informatics” Master’s degree programme can be admitted students with Bachelor’s degree graduated in:

- “Pedagogy of Education in Mathematics, Informatics and Information Technology”;
- “Physics and Mathematics” with “Teacher in Informatics” or “Teacher in Informatics and Information Technology” additional postgraduate qualification;
- “Mathematics” or “Applied Mathematics” with pedagogical qualification (“Teacher in Mathematics”) and “Teacher in Informatics” or “Teacher in Informatics and Information Technology” pedagogical qualification and additional postgraduate qualification
- “Informatics” with pedagogical qualification (“Teacher in Informatics”) and “Teacher in Mathematics” additional postgraduate qualification.

Requirements for the preparation of graduates of the specialty. Graduates of the specialty will be able to:

- apply the acquired knowledge in practice in their profession;
- competently use and apply fundamental knowledge from the fields of mathematics, informatics, and information technologies;
- master and apply modern educational technologies;
- apply information technologies in the educational process;
- conduct independent research activities, model real processes, and create computer applications to support learning;
- conduct pedagogical experiments.

Vocational Qualification and Competences Requirements for Students Graduated This Major

In the “Technologies of Teaching Mathematics and Informatics” Master’s degree programme competences of students, future teachers in Mathematics, Informatics and

Information technology are upgraded and expanded in compliance with tendencies in curriculum development in subjects studied in the secondary school and in line with the 2012 European Commission's Education Strategy and UNESCO ICT Competency Framework for Teachers. Students also acquire thorough competencies in the field of:

- pedagogical research modern methods and technologies;
- e-learning;
- specialized learning software for Mathematics and Informatics.

Students develop an affinity and capacity for independent scientific and research work in methodology of teaching Mathematics, Informatics and Information technology in school. The education received provides a solid foundation for continuing their education in Doctoral degree in the same vocational field.

Those who have acquired the professional qualification "Teacher of Mathematics, Informatics, and Information Technologies" should possess competencies in the following areas:

- **Teaching** – adapting knowledge in mathematics and informatics to students' age-specific characteristics and cognitive development levels; applying a competency-based approach to teaching through a variety of methods and technologies; motivating students to develop a responsible and conscious attitude towards learning, both during the educational process and independently; stimulating and maintaining students' interest in the learning content; applying diverse approaches, methods, and strategies to foster interdisciplinary connections and integration in teaching; diagnosing gaps in mastering the learning content and implementing a consultative approach in various activities for additional student support; utilizing information and communication technologies in synchronous remote e-learning or blended learning environments; and more.
- **Relationships with Students** – applying a student-centered approach; recognizing manifestations of mental processes and states in student behavior and responding appropriately; motivating students for learning and achievements in mathematics and informatics; adapting approaches and methods based on age-specific characteristics, as well as the psychological, intellectual, personal, and social development of students; adapting approaches in communicating with and teaching children with special educational needs and chronic illnesses; adapting approaches in communicating with and teaching gifted children in mathematics and informatics; and more.
- **Relationships with Other Pedagogical Specialists** – fostering effective relationships with the principal and vice-principals, teachers, and other pedagogical specialists, aimed at adhering to regulated norms for pedagogical work both within and outside the school; maintaining effective relationships with other teachers for mutual information exchange and discussing opportunities to support student learning and behavior; establishing effective relationships with the pedagogical advisor, psychologist, social worker, resource teacher, and speech therapist, in support of students needing assistance with emotional states and problematic behavior; adhering to professional ethics and maintaining constructive professional relationships in communication with other pedagogical specialists; and more.
- **Leadership** – creating and convincingly presenting a clear vision for the personal development of each student; identifying areas where efforts should focus on developing students' strengths; providing support through mentorship and coaching in students' personal self-development process; managing the class as a learning and developing community; utilizing imagination and applying a creative approach in generating ideas

preceding decision-making related to educational activities; developing and implementing original and unconventional ideas when possible, applicable, and likely to lead to better results within the classroom; and more.

- **Working with Parents and the Family Community** – recognizing key characteristics of the family environment that influence a child's development and upbringing; diagnosing the impact of specific family types on children's development and upbringing; recognizing the impact of relationships within the family environment on a child's personal development; establishing effective relationships with parents and representatives of the family community regarding mastering learning content and student behavioral manifestations; interacting with representatives of parents and the family community to prevent the risk of dropping out of the educational system; motivating parents and representatives of the family community for their active involvement in school-organized activities and interest-based activities; and more.
- **Educational Work** – implementing educational activities and situations for the formation and development of personal qualities and social competence in students; applying educational activities aimed at developing competencies for students' personal growth; applying educational principles and substantive directions of educational work depending on set goals, tasks, social, and personal needs; organizing a suitable working learning atmosphere in which each student can optimally develop their abilities and have opportunities for their expression; applying methods and techniques for prevention and management of conflict situations in the classroom and other areas of the school; and more.
- **Working in a Multicultural and Inclusive School Environment** – adapting pedagogical approaches, methods, and tools depending on individual and socio-culturally determined student needs; applying regulatory documents related to the implementation of inclusive, intercultural, and civic education in practical pedagogical activities; applying methods, techniques, and tools for fostering qualities such as tolerance, respect, empathy, goodwill, etc.; humanely resolving problematic situations arising in a multicultural and inclusive educational environment; actively involving all students, regardless of their differences, in classroom, extracurricular, and out-of-school activities to achieve common educational and upbringing goals; and more.

Professional Realization

A specialist who has completed the Master's program "Technologies of Teaching Mathematics and Informatics" is eligible to work as:

- A teacher of mathematics, informatics, and information technologies.
- A computer lab manager in a school.
- A system administrator in an educational institution.
- A lecturer in the field of mathematics, informatics, and information technologies in corporate training centers and vocational training centers.
- A methodologist or expert in mathematics, informatics, or information technologies at Regional Inspectorates of Education (RIOs) and the Ministry of Education and Science (MES).
- An e-learning material designer.
- A consultant on the application of information technologies in education.
- A mathematics specialist.
- An informatics and information technologies specialist.

Qualification characteristic of the “Technologies of teaching Mathematics and Informatics” Master’s degree programme for “Master” educational qualification degree with “Teacher in Mathematics, Informatics and Information Technology” vocational qualification is a main document-guideline for the development of courses curriculum and content. It complies with the Higher Education Act, with the Public Specialty Requirements, and with the SWU “Neofit Rilski” Regulations.

CURRICULUM STRUCTURE
Major: “Technologies of Teaching Mathematics and Informatics”
2 semesters

First year			
First Semester	Credits	Second Semester	Credits
<u>Compulsory Courses</u>		<u>Compulsory Courses</u>	
Pedagogical Researches Methodology and Methods	3,0	Stochastic Models in Pedagogical Researches	3,5
Selected Topics from School Mathematics Course	6,0	e-Learning Technology and Methodology	3,5
Selected Topics from School Informatics and Information Technology Course	4,5	STEM Educational Technologies in Science, Mathematics, and Informatics Education	2,0
Modeling in Mathematics Education	3,0	An elective course from group 3 (Informatics)	3,0
Extremum Problems in School Mathematics Course	4,5	An elective course from group 4	3,0
An elective course from group 1 (Mathematics)	4,5	Preparation and thesis defense	15,0
An elective course from group 2 (Informatics)	4,5		
Total:	30	Total:	30
<u>Elective Courses - I group</u>		<u>Elective Courses - III group</u>	
Fundamentals of Arithmetic	4,5	Computer Programming Learning Environments for Children Development	3,0
Fundamentals of Geometry	4,5	Information Technology in Teaching Students with Special Educational Needs	3,0
Fundamentals of Modeling	4,5	Computer Educational Games in Mathematics and Informatics Education	3,0
Mathematical Structures	4,5	Computer Design of Print and Advertising Materials	3,0
Functional Equations in Extracurricular Mathematics Activities	4,5	Web Design	3,0
History of Mathematics	4,5		
<u>Elective Courses - II group</u>		<u>Elective Courses - IV group</u>	
Information Systems Development	4,5	Polynomials in One and Several Variables	3,0
Specialized Statistical Software	4,5	MATLAB Mathematical Modelling Practical Course	3,0
Interactive Multimedia Technology	4,5	Teaching Mathematics Specialized Software	3,0
Internet Programming	4,5	Dialogic Teaching Software in Mathematics Development Methodology	3,0
Event-Driven Programming	4,5		
TOTAL FOR 1 STUDY YEAR: 60 CREDITS			

COMPULSORY COURSES

PEDAGOGICAL RESEARCHES METHODOLOGY AND METHODS

Semester: 1st semester

Course type: Lectures and seminars

Hours (per week): 1 hour lectures, 1 hour seminars

Credits: 3.0 credits

Assessment: An exam

Department: Pedagogy, Faculty of Pedagogy, SWU “Neofit Rilski”– Blagoevgrad, Phone: 0882/540 168

Discipline Curriculum Status: A compulsory course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The “Pedagogical researches methodology and methods” course introduces students to the essence and different aspects of the research process in upbringing and school education.

Course Aims and Objectives: The course aim is to provide students with knowledge of:

- designing scientific pedagogical research;
- methods of research and evaluation of pedagogical phenomena and processes;
- using mathematical and statistical methods for quantitative processing of empirical pedagogical information;
- structure of research text;

It also forms in students skills to: build conceptual foundations of pedagogical research; design experimental pedagogical methodologies; analyze essential aspects of empirical pedagogical information.

Teaching Methods: Lectures, seminars, consultations and tests

Assessment: The final grade is formed on the basis of an exam and current testing. The current testing includes: a test on the lectures material, two tests (current tests) on the seminars material, homework.

Exam Registration: Students agree with the lecturer the desired dates within the announced calendar for the exam sessions.

SELECTED TOPICS FROM SCHOOL MATHEMATICS COURSE

Semester: 1st semester

Course type: Lectures and seminars

Hours (per week): 2 hours lectures, 2 hours seminars

Credits: 6.0 credits

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski”– Blagoevgrad

Discipline Curriculum Status: A compulsory course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: Constructing and developing a concept of number are difficult processes both in their mathematical and philosophical aspect, but also in their learning and teaching aspect. Following the well-known from the Arithmetic concept of number construction, this course (for master students in Mathematics and Informatics) begins with basic algebraic laws formulation – communicative, associative, non-idempotent elements in the actions of addition and multiplication, along with distributive law combining the two operations of the natural numbers N . Based on addition and multiplication actions, corresponding regulations are also defined. Basic features of the linear ordinary are listed – bounded below by each set of natural numbers, Archimedes, etc., along with the method of mathematical ordinary associated with the two ordinaries. The question of divisibility of natural numbers and the concept of a prime number is also considered. All this is illustrated by specific examples. The question of recording a natural number in different number systems is also considered.

Since it is shown that for every two positive integers a, b the equations $a + x = b$ and $ax = b$ in the half-ring of natural numbers have no solutions, the need to extend the half-ring respectively to the ring of integers Z , the half-field of fractions Q and finally to the field of rational numbers Q , is clarified. For each of these structures, the validity of the basic features of the ordinaries introduced in the semicircle of natural numbers is emphasized. All of this is illustrated with relevant examples and problems. Most of the time spent in the study hours is in the field of real numbers and corresponding problems in this field – quadratic equations and inequalities, systems of equations and inequalities, including such with irrational expressions, and such equivalents with the participation of special functions such as exponential, logarithmic, trigonometric and other.

Extracurricular activity includes homework, course papers, work in libraries and computer rooms, consultations, tests preparation, understanding and learning the lectures material and more.

Course Aims and Objectives: Students should learn and understand basic concepts, actions and regulations of the number concept various extensions, along with use successfully the methods for solving equations, inequalities and systems of equations and inequalities in these extensions.

Teaching Methods: Lectures, seminars, consultations, homework, course papers, tests

Preliminary Enrollment Conditions: Students are expected to have good knowledge of “High School Mathematics” course.

Assessment: A written exam on the seminars and lectures contents.

Exam Registration: Students agree with the lecturer the desired dates within the announced calendar for the exam sessions.

SELECTED TOPICS FROM SCHOOL INFORMATICS AND INFORMATION TECHNOLOGY COURSES

Semester: 1st semester

Course type: Lectures and lab exercises

Hours (per week): 2 hours lectures, 1 hour lab exercises

Credits: 4.5 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: A compulsory course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is designed to expand the preparation of future teachers of Mathematics, Informatics and Information Technology in the field of school courses in Informatics and Information Technology in line with the rapidly changing technologies in Informatics and its applications. Topics studied in elective and extra-curricular courses on Informatics and Information Technology are included.

Topics about: structured texts and automatic content creation in word processing programs, spreadsheet processing of large volumes of data, interactive presentations with VBA, development and management of software projects, etc., are discussed.

Course Aims and Objectives: Upon completion of the course, students should be able to:

- process large volumes of data using spreadsheets;
- create interactive presentations using VBA;
- apply approaches to developing and documenting software projects.

Teaching Methods: Lectures, discussions, lab exercises

Preliminary Enrollment Conditions: Students should have studied “Information Technology” and “Event Programming”.

Assessment:

- A current grade – 50% of the grade;
- a written exam-test – 50% of the grade.

The course is considered to be successfully completed with a minimum of 53% of the maximum score.

Course Registration: Automatically (a compulsory course)

Exam Registration: In agreement with the lecturer and the Student office.

MODELING IN MATHEMATICS EDUCATION

Semester: 1st semester

Course type: Lectures and lab exercises

Hours (per week): 1 hour lectures, 1 hour lab exercises

Credits: 3.0 credits

Assessment: an exam

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: A compulsory course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: Mathematical modeling finds widespread application in the study of various processes and phenomena, especially in the fields of natural sciences and engineering. Methods related to modeling are incorporated into different branches of school mathematics (geometry, algebra, probability theory, various types of word problems). This course has theoretical and practical significance for introducing students to the relevant approaches.

Course Aims and Objectives: To acquaint students with the fundamentals of mathematical modeling and develop their skills in applying modeling to solve word problems from the school mathematics curriculum.

Teaching Methods: Lectures and lab exercises

Assessment: Continuous assessment, Current grade and Exam.

Course Registration: Automatically (a compulsory course)

Exam Registration: In agreement with the lecturer and the School office.

EXTREMUM PROBLEMS AND MODELLING IN SCHOOL MATHEMATICS COURSE

Semester: 1st semester

Course type: Lectures and seminars

Hours (per week): 2 hours lectures, 1 hour seminars

Credits: 4.5 credits

Assessment: An exam

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: A compulsory course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: Extremum problems occupy an important part of the “High School Mathematics” course. Main types of extremum problems that are studied in the “High School Mathematics” course are covered. Extremum problems of Antiquity and other known extremum problems are formulated: Didon’s problem, isoperimetric problem, Fermat’s problem, Kepler’s problem, brachystochron problem, along with extremum problems in nature (especially in optics).

Course Aims and Objectives: The aim and main objective of the “Extremum Problems and Modelling in High School Mathematics” course is to provide students with:

- knowledge of the basic results and methods of solving different classes of extremum problems, which are studied in the “High School Mathematics” course;
- ability to develop mathematical models;

- ability to apply extremum problems in mathematical modelling and elements of approximation theory.

Teaching Methods: Lectures, seminars, consultations, tests, homework

Assessment: The exam is written and consists of two parts:

- Part I – Problems. It consists of two problems.
- Part II – Theory. It consists of two topics from the syllabus, randomly drawn.

Students who have at least a Satisfactory (3) grade of the Part I are admitted to the second part of the exam. Students who have at least a Very good (4.50) grade as average score of the two current tests on sections 1, 2, 3 and 4 of Part I – are released from the first part of the exam.

The final grade is formed as follows: 30% – the homework grade, 40% – the grade from the Part I test and 30% – the grade from the Part II exam.

Course Registration: Automatically (a compulsory course)

Exam Registration: Students agree with the lecturer the desired dates within the announced calendar for the exam sessions.

STOCHASTIC MODELS IN PEDAGOGICAL RESEARCHES

Semester: 2nd semester

Course type: Lectures and lab exercises

Hours (per week): 1 hour lectures, 2 hours lab exercises

Credits: 3.5 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: A compulsory course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is designed as an upgrade of the base course in probability and statistics.

The aim of the course is to introduce students to the nature and numerous applications of nonparametric statistical methods, along with the possibilities for implementing part of these procedures with the tools of Information Technology (MS-Excel, VBA, SPSS, etc.).

The structure and content of the course are consistent with the students’ computer skills and their knowledge of probability and statistics acquired in respective courses. The subject matter of the syllabus is related to all disciplines in which the analysis of empirical data is required.

Course Aims and Objectives: Upon completion of the course, students should be able to:

- apply statistical modelling methods;
- implement specific applications using various technological tools.

Teaching Methods: Seminar, discussion, lab exercises

Preliminary Enrollment Conditions: Students should have studied “Probability and Statistics” and “Information Technology”.

Assessment:

- A course paper – 30% of the grade;
- a written exam – 70% of the grade.

The course is considered to be successfully completed with a minimum of 50% of the maximum score.

Course Registration: Automatically (a compulsory course)

Exam Registration: In agreement with the lecturer and the School office.

E-LEARNING TECHNOLOGY AND METHODOLOGY

Semester: 2nd semester

Course type: Lectures and lab exercises

Hours (per week): 2 hours lectures and 1 hour lab exercises

Credits: 3.5 credits

Assessment: An exam

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski”– Blagoevgrad

Discipline Curriculum Status: A compulsory course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is designed to provide training for future Mathematics, Informatics and Information technology teachers in e-learning technologies.

Topics related to the nature of e-learning, technologies for creating e-learning content are covered. Psychological and pedagogical aspects of e-learning are discussed. Using the Moodle e-learning environment is taught in detail.

Course Aims and Objectives: Upon completion of the course, students should be able to:

- describe technologies for creating e-learning content;
- create self-contained e-learning modules in an e-learning environment;
- administer users in an e-learning course.

Teaching Methods: Lectures, lab exercises, discussions

Preliminary Enrollment Conditions: Students should have studied the “Psychology”, “Pedagogy” and “Information Technology” courses.

Assessment:

- A current grade on the topics developed in the e-learning environment. (70% of final grade);
- an exam: defending developed electronic content (30% of final grade).

In case of a Poor (2) grade from the current testing, the student should additionally cover the requirements for a Sufficient (3) grade of the current testing in order to be admitted to the exam.

Course Registration: Automatically (compulsory course)

Exam Registration: In agreement with the lecturer and the Student office.

STEM EDUCATIONAL TECHNOLOGIES IN SCIENCE, MATHEMATICS, AND INFORMATICS EDUCATION

Semester: 2nd semester

Course type: Lectures and seminars

Hours (per week): 1 hour lectures, 1 hour seminars

Credits: 2.0 credits

Assessment: An exam

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: A compulsory course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The main idea of the course is to introduce students to an educational environment – a STEM center – which, through the implementation of innovative technologies and software solutions, will allow for the visualization of various aspects of the learning material in the educational process of future mathematics teachers.

Course Aims and Objectives: The aim of this course is to introduce students to the STEM environment, which will help them foster creativity in working with students and prepare them for successful future realization in various spheres of life, by developing their logical thinking, problem-solving skills, digital literacy, and emotional intelligence.

Teaching Methods: methods for STEM modeling; experimentation and augmented reality in STEM education; mixing virtual data (audiovisual and multimedia content); the STEM research approach; practical work and working with internet simulations; STEM methods for practical activity through the situational method; simulations of real-world problems; and combining traditional/standard teaching methods with STEM methods.

Assessment: The main form of assessing students' knowledge is a written examination. Students' knowledge and skills are evaluated using the six-point grading system, which includes: Excellent (6), Very Good (5), Good (4), Fair (3), Fail (2).

The assessment procedures applied during the education of students in the "Pedagogy of Mathematics, Informatics, and Information Technologies" major are: continuous assessment, current grade, and a final exam.

If a student receives a "Fail" grade from continuous assessment, they must additionally meet the requirements for a minimum "Fair" grade from continuous assessment to be admitted to the final examination.

Course Registration: Automatically (compulsory course)

Exam Registration: In agreement with the lecturer and the Student office.

ELECTIVE COURSES

FIRST GROUP (MATHEMATICS)

FUNDAMENTALS OF ARITHMETIC

Semester: 1st semester

Course type: Lectures and seminars

Hours (per week): 2 hours lectures, 1 hour seminars

Credits: 4. credits

Assessment: An exam

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The main aim of the comprehensive “High School Algebra course” is to construct a concept of number and related operations and relation of ordinary, starting with natural numbers, going through natural and rational numbers, and reaching real, and in individual cases and complex numbers. The overall theoretical construction and development of the above concepts is also an aim of the course. The basis of the course is theoretical-multiple. It begins with the definition of the term finite set, following the term induction set, introduced in the early 20th century by Bertrand Russell. Particular attention is paid in the beginning to the term natural number, to the operations of addition and multiplication of two natural numbers and the laws which satisfy them, and to the inequality between two natural numbers. It goes from decimal to arbitrary number system and continues with extensions of the half-ring of natural numbers to the ring of integers, to the half-field of fractions and their ordinaries, as extensions of the already established in the half-ring of natural numbers. The course ends with the review of real and complex numbers.

Course Aims and Objectives: It is introducing students to the modern theoretical ideas and presentation of the comprehensive “High School Algebra course”.

Teaching Methods: Lectures, seminars, consultations, course papers and tests

Preliminary Enrollment Conditions: Basic knowledge of higher algebra and number theory is required.

Assessment: Current testing during the semester, including course papers and tests, and a written exam on the seminars and lectures contents.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: In agreement with the lecturer and the Student office.

FUNDAMENTALS OF GEOMETRY

Semester: 1st semester

Course type: Lectures and seminars

Hours (per week): 2 hours lectures, 1 hour seminars

Credits: 4.5 credits

Assessment: An exam

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: Three of the Euclidean geometry’s axiomatics are outlined: D. Hilbert’s axiomatics, Kagan-Birchov-Kolmogorov’s metric axiomatics, and H. Weil’s axiomatics, and their equivalence are proved. Particular attention is paid to the fact that in metric axiomatics the concept of a real number is taken as a primary object, which is why complete metric axiomatics contains in addition the six geometric axioms and axioms for real numbers. This necessitates, in the proof that the Hilbert’s axioms follow the axioms of metric axiomatics, to prove that the axioms of real numbers follow the Hilbert’s axioms, which is done in detail.

We believe that the course will enrich the students’ knowledge of the deductive construction of Euclidean geometry, which will allow the future Mathematics teacher to acquire a solid professional training and to look at “School Geometry course” from a higher perspective.

Course Aims and Objectives: Students should acquire knowledge and skills for rigorous axiomatic method of constructing mathematical discipline.

Teaching Methods: Lectures, seminars, consultations, course papers and tests

Preliminary Enrollment Conditions: Basic knowledge of “Analytical geometry” and “School Geometry” course is required.

Assessment: Current testing during the semester, including homework and tests, and a written exam on the seminars and lectures contents.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: Students agree with the lecturer the desired dates within the announced calendar for the exam sessions.

FUNDAMENTALS OF MODELING

Semester: 1st semester

Course type: Lectures and seminars

Hours (per week): 2 hours lectures, 1 hours seminars

Credits: 4.5 credits

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: Mathematical modeling stands as one of the most widely utilized tools in contemporary science. This discipline encompasses the traditional foundational material of

mathematical modeling. Students will acquire an understanding of what a model is and the essence of modeling. A classification of mathematical models is presented, and a significant number of elementary models from diverse fields such as physics, chemistry, biology, medicine, and economics are examined. Topics such as static and dynamic modeling are also included.

Course Aims and Objectives: The aim of this course is to introduce students to the essence of mathematical modeling and to some basic models from various scientific domains.

Teaching Methods: Lectures, seminars, consultations, homework, current tests

Preliminary Enrollment Conditions: Basic knowledge of differential and integral calculus is required.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: Students agree with the lecturer the desired dates within the announced calendar for the exam sessions.

MATHEMATICAL STRUCTURES

Semester: 1st semester

Course type: Lectures

Hours (per week): 2 hours lectures, 1 hour seminar

Credits: 4.5 credits

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course on Mathematical Structures presents a logical, sequential, and comprehensive theory of the fundamental number systems taught in school: natural numbers, integers, rational numbers, and real numbers. These number systems are constructed using the terminology and core results of modern mathematics. This approach not only allows for the constructive building of these number systems but also enables their meaningful interpretation as semigroups, groups, semirings, rings, and fields. The theory of real numbers is developed through various approaches, including Dedekind cuts, the Cantor completion of the ordered field of rational numbers, decimal fractions, and continued fractions. The fundamental algebraic systems are presented not only from the perspective of their principal operations but also with regard to their principal relations, most notably linear and total order relations.

Course Aims and Objectives: The aim of this course is for students to acquire knowledge and skills in the aforementioned topics, and to apply this knowledge in their future pedagogical work.

Teaching Methods: Lectures, exercises, consultations, homework, course assignments, control checks.

Preliminary Enrollment Conditions: Basic knowledge of higher algebra, number theory and mathematical analysis is required.

Assessment: Current testing during the semester, including a course paper, and a written exam on the lectures material.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: Students agree with the lecturer the desired dates within the announced calendar for the exam sessions.

FUNCTIONAL EQUATIONS IN EXTRACURRICULAR MATHEMATICS ACTIVITIES

Semester: 1st semester

Course type: Lectures

Hours (per week): 2 hours lectures, 1 hour seminars

Credits: 4.5 credits

Assessment: An exam

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The aim of this discipline is to familiarize students with various methods for solving certain functional and differential equations, as well as the formulation of such equations derived from a range of physical, geometrical, algebraic, and other problems.

Course Aims and Objectives: To master the fundamental concepts and methods for solving certain functional and differential equations.

Teaching Methods: Lectures, seminars, homework, consultations, control checks.

Preliminary Enrollment Conditions: Strong knowledge in the fields of mathematical analysis and differential equations is required.

Assessment: Current control throughout the semester and a written exam.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: Students agree with the lecturer the desired dates within the announced calendar for the exam sessions.

HISTORY OF MATHEMATICS

Semester: 1st semester

Course type: Lectures

Hours (per week): 3 hours lectures

Credits: 4.5 credits

Assessment: An exam

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course includes the main stages of the development of mathematical knowledge until the end of the 19th century.

Course Aims and Objectives: It is to acquaint students with the basic stages in the development of mathematical knowledge by the end of the 19th century and to give them an idea of how this knowledge can be used in their future work as Mathematics teachers.

Teaching Methods: Lectures and consultations. The “History of Mathematics” course is taught according to the current plan – lectures, grouped in a block of 3 hours per week.

Preliminary Enrollment Conditions: Knowledge from the “School Mathematics” course.

Assessment: A written exam on the theory.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: Students agree with the lecturer the desired dates within the announced calendar for the exam sessions.

SECOND GROUP (INFORMATICS)

INFORMATION SYSTEMS DEVELOPMENT

Semester: 1st semester

Course type: Lectures and lab exercises

Hours (per week): 2 hours lectures and 1 hour lab exercises

Credits: 4.5 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski”– Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is designed to build and summarize the knowledge of students in Informatics, to introduce them to basic categories of software and to development of information systems. Particular attention is paid to organizational aspects in the use and development of information systems.

Extracurricular activity includes a course paper, work in a library and computer work. The course is a natural extension of the “Programming introduction” and “Databases” courses.

Course Aims and Objectives: Upon completion of the course, students should:

- know the main stages and approaches used in software technology;
- be able to develop software products (information systems) in accordance with the principles of software production.

Teaching Methods: Lectures, discussions, lab exercises

Preliminary Enrollment Conditions: Students should have studied the “Databases” course.

Assessment:

- A course paper – 50% of the grade;

- a written exam- test – 50% of the grade.

The course is considered successfully completed with a minimum of 51% of the maximum score.

Exam Registration: In agreement with the lecturer and the Student office.

SPECIALIZED STATISTICAL SOFTWARE

Semester: 1st semester

Course type: Lectures and lab exercises

Hours (per week): 2 hours lectures, 1 hour lab exercises

Credits: 4.5 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski”– Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The “Specialized Statistical Software” course is aimed at a thorough study of statistical modelling and its modern applications combined with the use of computer technology. Basic principles for modelling of empirical data and the capabilities of modern technologies for their realization (MS EXCEL, SPSS and STATISTICA, etc.) are included in the course.

Courses Aims and Objectives: The main aim is:

- to give students theoretical knowledge of contemporary application programs, along with the specifics of their use;
- to give students the knowledge to create correct statistical models and develop skills for their application;
- to introduce students to modern technologies for statistical data analysis;
- to prepare students for their future research work.

Teaching Methods: Seminars, discussions, exercises, simulations

Preliminary Enrollment Conditions: Students must have studied “Probability and Statistics” and “Information Technology” courses.

Assessment:

- A course paper – 30% of the grade;
- a written exam-test – 30% of the grade;
- performing current assignments – 40% of the grade.

The course is considered to be successfully completed with a minimum of 50% of the maximum score.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: In agreement with the lecturer and the Student office.

INTERACTIVE MULTIMEDIA TECHNOLOGY

Semester: 1st semester

Course type: Lectures and lab exercises

Hours (per week): 2 hours lectures, 1 hour lab exercises

Credits: 4.5 credits

Assessment: An exam

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is designed to provide training for future teachers in Mathematics, Informatics and Information Technology in the field of application of Information Technology in education, and in particular in the development of multimedia interactive learning content.

It is aimed at mastering basic principles and technologies for creating, processing and integrating various multimedia objects. The practical implementation is related to the design and development of interactive educational games (serious games, educational computer games). In recent years, there has been an increase in the development trends of so-called “serious games” applicable to various degrees of formal and corporate education and training. The acquired knowledge and skills can be actively used in the field of multimedia advertising and web design.

Questions related to basic concepts in interactive multimedia are included. The main features of authoring environments for creating interactive multimedia content are discussed. Basic technologies for creating interactive mobile applications and virtual reality are also discussed. Emphasis is placed on creating interactive presentations using VBA macros for learning purposes.

Various training methods are used. It focuses on problem solving and project based learning.

Courses Objectives and Expected Results: Upon completion of the course, students should be able to:

- create, edit and integrate various multimedia objects;
- develop interactive learning content using MS PowerPoint with VBA;
- apply basic principles and technologies for designing and creating interactive multimedia content.

Teaching Methods: Lectures, discussions, exercises, project based learning

Preliminary Enrollment Conditions: The “Information Technology” course

Assessment:

- A current grade – 60% of the grade;
- a written exam-test – 40% of the grade.

The course is considered to be successfully completed with a minimum of 53% of the maximum score.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: In agreement with the lecturer and the Student office.

INTERNET PROGRAMMING

Semester: 1st semester

Course type: Lectures and lab exercises

Hours (per week): 2 hours lectures, 1 hour lab exercises

Credits: 4.5 credits

Assessment: An exam

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is designed as an introduction to the development of Web-based information systems using the widespread and accessible JavaScript, CSS and PHP/MySQL technologies. It covers topics related to the design and implementation process of Internet/Intranet information systems. The course introduces students to the syntax and semantics of JavaScript and PHP, the correct design of information systems related databases, and the rules for building effective applications. Questions have also been raised related to improving the reliability and security of information systems in the context of the global information infrastructure.

Course Aims and Objectives: Upon completion of the course, students should be able to:

- design on Web-based information systems with “client-server” architecture;
- implement Web-based information systems using PHP/MySQL technology.

Teaching Methods: Lectures, discussions, lab exercises

Preliminary Enrollment Conditions: Students should have studied the “Databases” and “Web Design Workshop” courses.

Assessment:

- A course paper – 30% of the grade;
- a written exam-test – 70% of the grade.

The course is considered to be successfully completed with a minimum of 65% of the maximum score.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: In agreement with the lecturer and the Student office.

EVENT-DRIVEN PROGRAMMING

Semester: 1st semester

Course type: Lectures and lab exercises

Hours (per week): 2 hours lectures, 1 hours lab exercises

Credits: 4.5 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski”– Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is an introduction to event programming with Visual Basic (VB).

Topics related to graphical user interface design, operating system connection, and more are discussed.

Course Aims and Objectives: Upon completion of the course, students should be able to:

- work in a specific integrated visual development environment with graphical user interface;
- list and apply basic algorithmic constructs and operators in the VB programming language;
- create basic data structures in the event-driven programming environment and perform basic operations to work with them;
- set up and use objects to create software products in an event programming environment with graphical user interface.

Teaching Methods: Lectures, discussions, lab exercises

Preliminary Enrollment Conditions: Students should have studied the “Information Systems Development” course.

Assessment:

- A current grade – 50% of the grade;
- a written exam-test – 50% of the grade.

The course is considered to have successfully completed at least 53% of the maximum score.

Exam Registration: In agreement with the lecturer and the School office.

THIRD GROUP (INFORMATICS)

COMPUTER PROGRAMMING LEARNING ENVIRONMENTS FOR CHILDREN DEVELOPMENT

Semester: 2nd semester

Course type: Lectures and lab exercises

Hours (per week): 2 hours lectures, 1 hour lab exercises

Credits: 3.0 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski”– Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is designed to provide training for future Informatics and Information Technology teachers in the field of applying computer programming learning environments for children.

Topics related to common features of computer programming learning environments for children are considered. Specific features of Scratch, Kodu, Tynker, etc., block programming environments. Game-based online training resources for programming are also considered. Methodical aspects of teaching children in elementary and upper secondary education are also discussed.

Course objectives and Expected Results: Upon completion of the course, students should be able to:

- program in a block programming environment;
- use online game-based programming environments;
- select appropriate resources and programming training assignments appropriate to age characteristics of students.

Teaching Methods: Lectures, laboratory exercises, consultations, course assignments

Preliminary Enrollment Conditions: Basic knowledge of the “Teaching Methodology in Informatics”, “Teaching Methodology in Mathematics”, “Pedagogy”, “Psychology”, “Information Technology in Teaching Students with Special Educational Needs” courses is required.

Assessment: The exam includes defending developed projects and providing a practical assignment solution on the spot.

Exam Registration: In agreement with the lecturer and the Student office.

INFORMATION TECHNOLOGY IN TEACHING STUDENTS WITH SPECIAL EDUCATIONAL NEEDS

Semester: 2nd semester

Course type: Lectures and lab exercises

Hours (per week): 2 hours lectures, 1 hour lab exercises

Credits: 3.0 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski”– Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is designed to provide training for future Informatics and Information Technology teachers in the field of applying Information and Communication Technology in teaching and working with children with special educational needs (SEN).

Topics related to hardware and software assistive technologies for various types of disruption and educational needs are considered.

The course was developed with the assistance of Assoc. Prof. Lyudmila Yashkova from the Department of Informatics Teaching at Komenski University, Bratislava and assistants from

the Assistive Technology Center at Komenski University, Bratislava, Slovakia. With the Slovak Academic Information Agency financial support.

Course Aims and Objectives: Upon completion of the course, students should be able to:

- identify appropriate teaching technologies for students specific educational difficulties;
- adapt educational resources for students with different educational needs;
- use game-based teaching;
- select appropriate resources and technologies for teaching special educational needs persons.

Teaching Methods: Lectures, lab exercises, discussions, a course paper on a selected topic from the seminars

Preliminary Enrollment Conditions: Basic knowledge of the “Pedagogy”, “Psychology” and “Information Technology in Teaching Students with Special Educational Needs” courses is required.

Assessment: The exam includes presenting and defending a developed course paper.

Exam Registration: In agreement with the lecturer and the Student office.

COMPUTER EDUCATIONAL GAMES IN MATHEMATICS AND INFORMATICS EDUCATION

Semester: 2nd semester

Course Type: Lectures and laboratory exercises

Hours (per week): 2 hours lectures, 1 hour lab exercises

Credits: 3.0 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the curriculum of the “Technology of Teaching Mathematics and Informatics” specialty.

Brief Description: The discipline “Computer Educational Games in Mathematics and Informatics Education” is part of the curriculum and comprises 8 generalized topics. Current control and an exam are envisaged as forms of assessment. The content of the program covers key issues related to the theoretical, methodological, and technical preparation for the creation and utilization of computer educational games in mathematics and informatics. Students who successfully pass the exam in “Computer Educational Games in Mathematics and Informatics Education” will acquire the necessary minimum knowledge for both creating prototypes of elementary educational games and identifying ways to integrate them into the educational process. During practical exercises, students are trained in developing scenarios, creating educational games, and determining the place and role of computer games in the mathematics and informatics educational process.

Course Aims and Objectives: The aim of the discipline “Computer Educational Games in Mathematics and Informatics Education” is to develop knowledge and skills for creating scenarios and prototypes of educational computer games and applying them in the educational process.

Expected Learning Outcomes: Upon completion of the course, students should be able to:

- Create scenarios for computer educational games for the primary school level.
- Create prototypes of elementary educational games using various technological tools.
- Plan lesson activities.
- Apply educational computer games in the educational process.

Course Registration: It is necessary to submit an application to the Student Office.

Exam Registration: In agreement with the lecturer and the Student Office.

COMPUTER DESIGN OF PRINT AND ADVERTISING MATERIALS

Semester: 2nd semester

Course type: Lectures and lab exercises

Hours (per week): 2 hour lectures, 1 hours lab exercises

Credits: 3.0 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: This course provides a practical introduction to **publishing systems**. Students will become familiar with best practices for developing print and electronic materials, such as advertising brochures, flyers, posters, magazines, newspapers, and more. The principles of working with software products used in publishing are studied. Typical tasks in the field of publishing and advertising are reviewed. The course prepares students for the future development of various types of designs for advertising materials, websites, and so forth.

Course Aims and Objectives: This course aims to provide students with in-depth knowledge and additional preparation regarding the theory and practice of publishing systems. They will learn about methods for processing digital images, techniques for creating vector graphics, and the prepress preparation of advertising materials for various purposes.

Teaching Methods: Discussion, demonstration, project-based work, and teamwork.

Preliminary Enrollment Conditions: Basic knowledge of operating systems, information technologies, and experience with graphic editors and multimedia files are required.

Assessment: Student assessment is conducted using the six-point grading system (2, 3, 4, 5, 6). The current control grade is obtained by taking the arithmetic mean of the course project grade and the term paper grade. Students who do not achieve a minimum current control grade of "satisfactory" (3) are not permitted to take the exam during the regular session. They must submit additional assignments, and upon receiving a grade of at least "satisfactory" (3), they will be allowed to take a written exam during the make-up or liquidation session. The final grade is calculated as the arithmetic mean of the current control results and the written exam grade.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: In agreement with the lecturer and the Student office.

WEB DESIGN

Semester: 2nd semester

Course type: Lectures and lab exercises

Hours (per week): 2 hour lectures, 1 hours lab exercises

Credits: 3.0 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski”– Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: This course examines the issues and techniques related to the organization and visualization of content on the web. It presents approaches for building static and dynamic pages and integrating them into complete websites. Current software products for website development are reviewed. An introduction to HTML, XHTML, and CSS languages is provided. During laboratory sessions, a website will be developed using HTML, CSS, JavaScript, C#, and ASP.Net MVC languages and technologies. The course will enable students to develop and refine their skills in creating designs and concepts for websites, using appropriate web fonts, and creating and processing vector and raster images suitable for building web content.

Course Aims and Objectives: This course aims to provide students with in-depth knowledge and additional specialized training in the theory and practice of responsive web design. They will become familiar with methods and techniques for building a conceptual model of a website, selecting and utilizing multimedia objects, aligning and positioning them based on device type, and publishing a website and maintaining a web server.

Teaching Methods: Discussion, demonstration, project-based work, and teamwork.

Preliminary Enrollment Conditions: Basic knowledge of operating systems, information technologies, and experience with graphic editors and multimedia files are required.

Assessment: Student assessment is conducted using the six-point grading system (2, 3, 4, 5, 6). The current control grade is obtained by taking the arithmetic mean of the course project grade and the term paper grade. Students who do not achieve a minimum current control grade of "satisfactory" (3) are not permitted to take the exam during the regular session. They must submit additional assignments, and upon receiving a grade of at least "satisfactory" (3), they will be allowed to take a written exam during the make-up or liquidation session. The final grade is calculated as the arithmetic mean of the current control results and the written exam grade.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: In agreement with the lecturer and the Student office.

FOURTH GROUP (MATHEMATICS)

POLYNOMIALS OF ONE AND SEVERAL VARIABLES

Semester: 2nd semester

Course Type: Lectures and seminar exercises

Hours (per week): 2 hours lectures, 1 hour exercises Credits: 3.0 credits

Assessment: Exam

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the curriculum of the “Technology of Teaching Mathematics and Informatics” specialty.

Brief Description: The elective course "Polynomials of One and Several Variables" deepens and expands students' knowledge acquired in the Algebra and Number Theory course. The course begins with an overview of fundamental concepts such as polynomials of one variable, operations with polynomials, roots of polynomials, and polynomial factorization. The algebraic closure of the field of complex numbers is proven. Some essential consequences of D'Alembert's theorem are examined. The factorization of polynomials with real and complex coefficients is studied. Students are introduced to Cardano's formulas for solving cubic and quartic equations. Definitions and examples of cyclotomic (circle) polynomials and matrix polynomials are provided. The section on polynomials of several variables first reviews basic concepts and statements related to symmetric polynomials, after which power sums are introduced and Newton's formulas for the relationship between power sums and elementary symmetric polynomials are presented. The concepts of discriminant and resultant of polynomials are discussed. Attention is paid to solving nonlinear algebraic systems of equations using the resultant.

Course Aims and Objectives: The aim of this course is for students to acquire deeper knowledge and skills concerning polynomials of one and several variables, as well as the applications of this apparatus for the algebraic solvability of certain special types of equations.

Teaching Methods: Lectures, seminar exercises, consultations, homework, control checks.

Preliminary Enrollment Conditions: Basic knowledge from the Linear Algebra and Algebra and Number Theory courses is required.

Assessment: Current control during the semester, including homework and tests, and a written exam covering the seminar exercises and lecture material.

Course Registration: An application must be submitted to the Student Office.

Exam Registration: Students coordinate with the lecturer for desired exam dates within the announced calendar schedule for exam sessions.

MATLAB MATHEMATICAL MODELLING PRACTICAL COURSE

Semester: 2nd semester

Course type: Lectures and lab exercises

Hours (per week): 1 hour lectures, 2 hours lab exercises

Credits: 3.0 credits

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is included as an elective in the “Technology of Teaching Mathematics and Informatics” curriculum and is intended for students with a keen interest in mathematical modelling and mathematical models numerical implementation through software products, in particular – Matlab software environment. It introduces students to the abundant capabilities of Matlab, which is a solid base for performing analytical and numerical calculations in a number of fields, along with creating their own software packages.

Course Aims and Objectives: The course discusses basic functions of the Matlab core and how to create new programs (m-files). Particular attention is paid to programming and creating custom programs for solving mathematical models. The aim of the laboratory exercises is to acquaint students with the graphical environment for simulation of Simulink systems and the abundant Matlab capabilities for calculating boundaries, derivatives, integrals, functions study and complex numbers actions or most total with the environment applying in mathematical modelling.

Teaching Methods: Lectures, lab exercises, consultations, tests

Preliminary Enrollment Conditions: Basic knowledge of the “School Mathematics” course and subjects, such as “Linear Algebra”, “Analytical Geometry”, and “Mathematical Analysis” is required. It is also an advantage if a programming language is known.

Assessment: Current testing during the semester, including two tests, and a written exam on lab exercises and lecture material.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: In agreement with the lecturer and the Student office.

TEACHING MATHEMATICS SPECIALIZED SOFTWARE

Semester: 2nd semester

Course type: Lectures and lab exercises

Hours (per week): 1 hour lectures, 2 hours lab exercises

Credits: 3.0 credits

Department: Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is designed to provide training for future Mathematics, Informatics and Information Technology teachers in applying Information Technology in Mathematics education in accordance with rapidly changing technologies.

Topics related to general characteristics of software applications in Mathematics education, application of general purpose software – spreadsheets, specialized software for dynamic mathematics – Mathematical constructor, Geogebra, Geonect and others are discussed. Methodical aspects in applying software in Mathematics education are also discussed.

Course Aims and Objectives: Upon completion of the course, students should be able to:

- evaluate the capabilities of software products for their application in Mathematics education;
- make use of spreadsheet capabilities in Mathematics lessons;
- use adequately specialized software for dynamic mathematical constructions.

Teaching Methods: Lectures, discussions, lab exercises

Preliminary Enrollment Conditions: None

Assessment:

- A current grade – 60% of the grade;
- a written exam-test – 40% of the grade.

The course is considered to be successfully completed with a minimum of 53% of the maximum score.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: In agreement with the lecturer and the Student office.

DIALOGIC TEACHING SOFTWARE IN MATHEMATICS DEVELOPMENT METODOLOGY

Semester: 2nd semester

Course type: Lectures and lab exercises

Hours (per week): 1 hour lectures, 2 hours lab exercises

Credits: 3.0 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski”– Blagoevgrad

Discipline Curriculum Status: An elective course in the “Technology of Teaching Mathematics and Informatics” curriculum

Brief Description: The course is designed to provide training for future teachers in Mathematics, Informatics and Information Technology in the field of applying Information Technology in Mathematics education in regard to the methodology and technology of interactive learning software development.

Topics related to common features of interactive learning software, structuring and software development applications are discussed. The course allows students to choose development technology such as: Interactive Presentations with MS Power Point and Visual Basic for Application, Adobe Captivate, Adobe Flash and Java Script.

Course Aims and Objectives: Upon completion of the course, students should be able to:

- design interactive software;
- develop interactive software;

- analyze the functional features of interactive learning software.

Teaching Methods: Lectures, discussions, lab exercises, a project work

Preliminary Enrollment Conditions: The school course in “Information Technology”, the school courses in “Algebra” and “Geometry”, the “Teaching Mathematics Methodology” course, the “Audio-Visual and Information Technology in Teaching” course

Assessment:

- A current grade – 70% of the grade;
- a written exam-test – 30% of the grade.

The course is considered to be successfully completed with a minimum of 53% of the maximum score.

Course Registration: It is necessary to apply to the Student office.

Exam Registration: In agreement with the lecturer and the Student office.
