QUALIFICATION CHARACTERISTIC OF A MAJOR FIELD OF STUDY

"PEDAGOGY OF TEACHING IN MATHEMATICS, COMPUTER SCIENCE AND INFORMATION TECHNOLOGY"

"Bachelor of Science" Degree with a Professional Qualification **"Teacher of Mathematics, Informatics and Information Technology"**

The specialty "Pedagogy of Teaching in Mathematics, Computer Science and Information Technology" is from professional Area 1.3. Education Pedagogy ... The Bachelor degree is 4 years. The bachelors' graduates in this specialty acquire the professional qualification "Teacher of Mathematics, Computer Science and Information Technology".

Requirements for the Professional Qualification and Competences of Students Completing This Major Field of Study

The specialty **"Pedagogy of Teaching of Mathematics, Informatics and Information Technology"**, through the compulsory subjects included in the curriculum, provides fundamental broad-based preparation for students, and through the elective and optional disciplines – more profound knowledge in the fields of mathematics, psychology, methodology and pedagogy of mathematics, informatics and information technology, as well as other fields such as economics, ecology, business, law and more. Graduates have basic knowledge in mathematical fields such as algebra, geometry, mathematical analysis, differential equations, probabilities and statistics, numerical methods, mathematical optimization, as well as knowledge in computer science such as object-oriented programming, data structures and algorithms, information technology, and more. Bachelors in "Pedagogy of Teaching of Mathematics, Informatics and Information Technology", also have in-depth theoretical knowledge of psychology, pedagogy and methodology of teaching mathematics, computer science and information technology in school, as well as the knowledge and skills to perform pedagogical experiments and analyze their results. In the learning process, students acquire the skills and knowledge to independently search for the necessary scientific information from literary sources, multimedia presentation of various projects, reports and messages. Good command of English is a prerequisite for their successful professional realization**.**

PROFESSIONAL SKILLS AND COMPETENCE

After completing the Bachelor's Degree in the major, the student must have the following knowledge and skills:

- Knowledge of basic mathematical theories, principles and results in the various fields of mathematics;
- Building rigorous mathematical proofs and demonstrate proficiency in various methods of mathematical proof;
- Knowledge of the basic principles of computer science, programming, algorithms, know how to and successfully use information technology;

- Knowledge of the basic principles of pedagogy and teaching methodology of mathematics and informatics, and to be able to apply them in his pedagogical practice.

Each graduate teacher of mathematics, informatics and information technology must have acquired the following key skills: ability to formulate mathematical statements, to present evidence of those statements, to be familiar with the basics of computer science and information technology.

The basic skills that will improve the competencies of a teacher in mathematics and computer science are:

- Mastering the basics of elementary and high mathematics and being able to apply them creatively in his work;
- To be able to organize experimental studies, analyze their data, model the situation; to work with mathematics in an interdisciplinary context; to use computing tools to retrieve information;
- To be able to use abstract and logical thinking, of quantitative and qualitative analysis of the problems related to his professional realization;
- To be able to extract qualitative information from quantitative data;
- To organize experimental studies, analyze their data and model situations of pedagogical and methodological type;
- To use specialized programming languages and software in his/her work;
- To know English and to use it to gain new knowledge and to advance in one's professional realization.

PROFESSIONAL REALIZATION

The specialists in the area of "Pedagogy of Teaching in Mathematics, Informatics and Information Technology" are prepared to carry out pedagogical and educational work in all types and grades of educational institutions and institutes of the educational system.

The graduates of the major are prepared theoretically and practically to work as teachers of mathematics, informatics and information technology in all types of secondary schools, and as educators in classrooms, dormitories and others, to organize and conduct the educational process of mathematics, informatics and information technology in workshops, trainings and extracurricular courses. The teachers in the major can discover and develop the creativity of the students, needed to solve scientific, industrial and other problems, to provide proper professional orientation, to develop practical, experimental and intellectual skills in their students. These specialists can carry out experiments using teaching laboratory and computer equipment, and work as lecturers at universities and researchers at BAS institutes.

FLEXIBILITY OF SPECIAL TRAINING

The Faculty of Mathematics and Natural Sciences provides the parameters that guarantee the flexibility of the chosen specialty:

- acquisition of a second or new specialty within the framework of the bachelor program;
- transition from training in one major to another;
- acquisition of a higher education degree;

- early completion of training if desired by trainees;
- acquisition of a new major;
- transfer to another higher education institution, faculty, major and form of education;
- interrupting students' learning and continuing thereafter;
- selecting the lecturer by the students when more than one lecturer is teaching one course.

ADMISSION REQUIREMENTS AND PROCEDURES

The prerequisite knowledge, skills and abilities are described in the admission exam syllabus of mathematics. This information is available in the SWU “Neofit Rilski” Student Directory. Candidate - students take the entrance examination and after its successful passing, participate in the ranking for their desired majors.

CURRICULUM STRUCTURE

Major in **"Pedagogy of Teaching of Mathematics, Informatics and Information Technology"**

First year			
First Semester	**ECTS credits**	**Second Semester**	**ECTS credits**
Compulsory Courses		***Compulsory Courses***	
Introduction to Mathematics	3,0	Mathematical Analysis 2	5,5
Linear Algebra	5,5	Algebra and Number Theory	5,5
Analytical Geometry	5,5	Workshop on Mathematical Analysis	2,0
Mathematical Analysis - 1	6,0	Databases	5,5
Workshop on Linear Algebra and Analytical Geometry	2,0	Mathematical Logic	4,0
Introduction to Programming	6,0	Object-oriented Programming	5,5
Foreign Language 1	2,0	Foreign Language 2	2,0
Sport	0		
Total:	30	**Total:**	30
		Total ECTS credits for the 1st study year:	60
Second year			
Third Semester	**ECTS credits**	**Fourth Semester**	ECTS credits
Compulsory Courses		***Compulsory Courses***	
Differential Equations	6,0	Mathematical Optimization	5,5
Scholar course of education in mathematics-1	6,0	Operating System	5,5
Scholar course of education in Algebra and analysis	2,0	School course of mathematics-2	5,5
Introduction to Information Systems and Technologies	4,0	School Course in Informatics and Information Technologies	5,5
School course in computer modeling and informatics	6,0	Pedagogy	6,0
Psychology	6,0	Practicum for solving problems from the school geometry course	2,0
Sport	0,0		
Total:	30	**Total:**	30
		Total ECTS credits for the 2nd study year:	60
Third year			
Fifth Semester	**ECTS credits**	**Sixth Semester**	**ECTS credits**
Compulsory Courses		***Compulsory Courses***	
Methods of teaching informatics and information technology	5,5	Probability and Statistics-Methodology and Technologies	6,0
Classroom observation in Informatics and Information Technologies	1,5	Intellectual property protection	3,0
Computer architectures	4,0	Methods in teaching mathematics-I	3,0

Numerical Methods	5,5	Classroom Observation in mathmetics	1,5
Geometry	5,5	Computer security	4,5
Optional course from II.A (group 1)	4,0	STEM Educational technologies in teaching natural sciences, mathematics and informatics	3.0
Optional course from II.B (group 1)	4,0	Optional course from II.A (group 2)	4,5
Sport	0,0	Optional course from II.B (group 2)	4,5
Total:	30	**Total:**	30
		Total ECTS credits for the 3rd study year:	60
Optional courses from II.A (group 1)		***Optional courses from II.A (group 2)***	
Fundamentals arithmetic	4,0	Practical course in mathematical modelling in Matlab	4,5
Fundamentals of geometry	4,0	Polynomials of one or more variables	4,5
Fundamentals of Mathematical Modeling	4,0	Numerical methods Monte Carlo	4,5
Mathematical structures	4,0	Discrete mathematics	4,5
Optional courses from II.B (group 1)		***Optional courses from II.B (group 2)***	
Algorithms and problems in extracurricular activities in informatics and IT	4,0	Graphic design of printed and promotional materials	4,5
Internet technologies	4,0	Web content management	4,5
Technology and data processing from pedagogical experiments	4,0	Python programming	4,5
Java Script programming	4,0	Web Design	4,5
		Educational computer games in mathematics and informatica	4,5
Fourth year			
Seventh Semester	**ECTS credits**	**Eighth Semester**	**ECTS credits**
Compulsory Courses		***Compulsory Courses***	
Methods in teaching mathematics - II	6,0	Teacher practice in mathematics	4,0
Ongoing teaching practice in mathematics	3,0	Teacher Practice in Informatics and Information Technologies	4,0
Current Teaching Practice in Informatics and Information Technologies	3,0	Inclusive Education	2,0
Information and communication technology for teaching and working in digital environment	3,0	Ccompetency-based approach and innovations in educationOMPETENCY	4,0
Network and System Administration	6,0	Optional course from I.	3,0
Optional course from II.A (group 3)	4,5	Optional course from I.	3,0
Optional course from II.B (group 3)	4,5	Graduation	10,0
Sport	0,0		
Total:	30	**Total:**	30
		Total ECTS credits for the 4th study year:	60

Optional courses from II.A (group 3)		***Optional courses from I.***	
Symmetric Semigroups	4,5	Digital Competence and Digital Creativity	3,0
Mathematical models in economics	4,5	Development of lessons for e-learning	3,0
Numerical methods for exremum problems	4,5	Pedagogical interaction in a multicultural environment	3,0
Specific STEM educational technologies in mathematics education	4,5	Management of Educational Institutions	3,0
History of mathematics	4,5	Inclusive education for children and students with special educational needs	3,0
Optional courses from II.B (group 3)		Communication Skills in an Educational Environment	3,0
Interactive multimedia technologies	4,5	Civic Education	3,0
Theoretical foundation of informatics	4,5		
Technologies for the development and analysis of didactic tests	4,5		
Specific STEM educational technologies in informatics education	4,5		
		Elective Courses	
		Students may choose to study any course offered at the university as an elective, regardless of the faculty organizing the instruction**. At least one elective course with a minimum of 15 hours is mandatory.**	

Total for 4 years: 240 credits

COMPULSORY COURSES

INTRODUCTION TO MATHEMATICS

Semester: 1 semester
Form of the course: Lectures/ exercises
Hours (per week): 1 hour lectures + 2 hours exercises per week, summer semester
ECTS Credits: 3 credits
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural sciences, South West University "Neophit Rilsky"- Blagoevgrad
Status of the course in the education program: Compulsory course in B. S. Curriculum of "Pedagogy of teaching Mathematics, Informatics and IT"
Description of the course: The subject education includes the study of basic number system, the theory of algebrical polynomials and the basic algebrical theorem.
Aims of the course: The students obtain knowledges and skills in the already mentioned themes and learn how to use them in their future educational practice.
Methods: lectures, exercises discussions, partial exercises.
Preliminary requirements: The students must have basic knowledge from school course of mathematics
Evaluation: permanent control during the semester (two written exams) an exam in the semester's end in two parts- problems solving and answering theoretical questions.
Registration for the course: The course is obligatory.
Registration for exam: up to agreement with the teacher and the Educational Office

LINEAR ALGEBRA

Semester: 1 Semester
Course type: lectures + labs + exercises
Hours per week: 2 hours lectures + 2 hour exercises
ECTS credits: 5.5 credits
Assessment: exam
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The course includes the study of: basic concepts of combinatorics and complex numbers, matrices, determinants, systems of linear equations and methods for solving them, linear spaces, linear transformations and their actions, orthogonal and symmetric matrices and transformations, quadratic forms canonization.
Course Objectives: Students must acquire knowledge and skills to apply the studied theory to modeling and solving real-world practical problems, to perform basic actions with

matrices, to solve determinants, systems of linear equations by Gauss and Kramer methods, to work freely with linear spaces and transformations, to quadratic form in canonical form.
Teaching Methods: Lectures, exercises, consultations, homework, coursework and ongoing tests.
Requirements/Prerequisites*:* Basic knowledge of the high school mathematics is required.
Assessment: Continuous control during the term, including homework and supervision, and a written exam on the topics of seminars and lectures.
Registration for the exam: in agreement with the teacher and the department of student education.

ANALYTICAL GEOMETRY

Semester: 1 Semester
Course type: lectures + labs + exercises
Hours per week: 2 hours lectures + 2 hour exercises
ECTS credits: 5.5 credits
Assessment: exam
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description:
The course includes the study of: vector calculus with free vectors, affine coordinate systems and analytical representation of lines and planes. After the introduction of the double ratio, projective coordinate systems are also used. The basic elements of projective, affine and metric theory of second degree figures are studied.
Course Objectives:
Students should acquire knowledge and skills to implement the analytical apparatus for the study of geometric objects.
Teaching Methods: Lectures, exercises, consultations, homework, coursework and ongoing tests.
Requirements/Prerequisites*:* Basic knowledge of Linear Algebra and Mathematical Analysis is required.
Assessment: written exam on the topics of seminars and lectures.
Registration for the exam: in agreement with the teacher and the department of student education.

MATHEMATICAL ANALYSIS 1

Semester: 1 Semester
Course type: lectures + labs + exercises
Hours per week: 2 hours lectures + 2 1 hour exercises
ECTS credits: 6.0 credits
Assessment: exam

Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: Discipline training involves learning infinite numbers and rows, boundary, continuity and derivative of the function of a variable, as well as exploring the variation and plotting the functions of a variable. Indefinite and definite integrals are studied.
Course Objectives: Learning the basic methods for studying the functions of a variable, as well as the basic methods for solving indefinite and definite integrals.
Teaching Methods: Lectures, exercises, consultations, homework, coursework and ongoing tests.
Requirements/Prerequisites: good knowledge of the high school mathematics is required.
Assessment: Written exam on the topics of the seminars and lectures.
Registration for the exam: In agreement with the teacher and the department of student education.

WORKSCHOP ON LINEAR ALGEBRA AND ANALYTICAL GEOMETRY

Semester: 1 semester
Course Type: Tutorials
Hours per week /FS/SS: 2 tutorial hours /FS
ECTS credits: 2,0 credits
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, South-West University "Neofit Rilski" – Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of „Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The education of that discipline includes some of the basic notations in Linear Algebra and Analytical Geometry, and the included topics are analyzed and implemented with the help of basic software.
Course Aims: The purpose of this course is to introduce students with the opportunity to use modern methods and tools for solving problems of Linear Algebra and Analytical Geometry.
Teaching Methods: tutorials, homework and tests.
Requirements/Prerequisites: The students should have basic knowledge in Linear Algebra and Analytical Geometry.
Assessment: permanent control during the semester including two homework and two tests, or exam in the semester's end.
Registration for the exam: coordinated with the lecturer and student Service Department

INTRODUCTION IN PROGRAMMING

Semester: 1 semester
Type of Course: Lectures and tutorials in computer lab.
Hours per week: 2 hour lectures, and 2 hour tutorials in computer lab/autumn semester.
Credits Numbers: 6 credits

Department: Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski"– Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of „Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Course description: The course is first in area in programming for the students. The course includes topics related to syntax and semantics of programming languges, statements and operators in programming languages, arrays and functions. The course is based on the C++ programming language.
Objectives: The student should obtain basic knowledge in area of programming and algorithms
Methods of teaching: lectures, tutorials, discussions, project based method.
Pre - requirements: No
Assessment and Evaluation
Assignments and tests - 60%
Final Test and problem solving - 40%
The course is successful completed with at least 51 % of all scores.
Registration for the Course: No
Registration for the Exam: coordinated with the lecturer and the Student Service Office

FOREIGN LANGUAGE 1

Semester: 1 Semester
Course type: lab
Hours per week: 2 hours exercises
ECTS credits: 2.0 credits
Assessment: ongoing assessment
Department: Faculty of Philology, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The course "English Language" introduces students with the basics of English - grammar and vocabulary. The covered topics include phonetics, spelling, the parts of speech, verb tenses and syntax in English.
Course Objectives: The purpose of the course is to provide students with knowledge of grammar rules and basic lexical knowledge; to meet the minimum requirements for written and spoken English language; to gain the ability to understand and use the common computer terminology.
Teaching Methods: Lab.
Requirements/Prerequisites: Minimum initial knowledge from high school would serve as a basis for upgrading new knowledge and skills.
Assessment: written exam.
Registration for the course: it is necessary to apply to the department at the end of current semester.

Registration for the exam: in agreement with the teacher and the department of student education.

MATHEMATICAL ANALYSIS 2

Semester: 2 Semester
Course type: lectures + labs + exercises
Hours per week: 2 hours lectures + 2 hours labs
ECTS credits: 5.5 credits
Assessment: exam
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The training in the course involves learning the basic concepts of mathematical analysis - part two. The course includes studying the functions of two or more variables, continuity, partial derivatives, local and conditional extremes, implicit functions, change of variables. Definition of double and triple Riemann`s integral, properties and applications for calculating faces and volumes. First and second-order curvilinear integrals. Surface integrals of the first and second kind. Basic integral formulas of analysis.
Course Objectives: Mathematical Analysis` discipline - part two is a basic mathematical discipline in the preparation of students. Knowledge is required to study Mathematical Analysis III, ordinary differential equations, optimization, numerical methods and more.
Teaching Methods: Lectures, exercises, consultations, homework, coursework and ongoing tests.
Requirements/Prerequisites: Basic knowledge of Mathematical Analysis I is required.
Assessment: Written exam on the topics of the seminars and lectures.
Registration for the exam: in agreement with the teacher and the department of student education.

ALGEBRA AND NUMBER THEORY

Semester: 2-nd semester
Course Type: Lectures and tutorials
Hours per week /FS/SS: 2 lecture hours and 2 tutorial hours /SS
ECTS credits: 5,5 credits
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, South-West University "Neofit Rilski" – Blagoevgrad,
Course Status: Compulsory course in the B.S. Curriculum of „Pedagogy of teaching Mathematics, Informatics and IT".
Short Description: The course considers the main notations from number theory (first part), theory of algebraic structures (second part), and algebraic polynomials (third part). The education starts with some basic notations from set theory, relations, operations and mappings. In the first part, we introduce the main definitions and propositions from number

theory like divisibility, congruences, primes and the fundamental theorem of arithmetic. The second part of the course consider algebraic structures with one binary operation (semigroups and groups) and algebraic structures with two binary operations (rings and fields). The definitions are introduced in an abstract way and explained with many examples. In the last part the classical polynomial questions like quotient/remainder theorem, Euclid's algorithm, Horner's scheme, roots of polynomials, and symmetric polynomials are considered.

Course Aims: The students have to obtain knowledge and skills for the basic notions and methods of the elementary number theory, the semigroup and group theory, the ring and field theory, and the polynomials with one and with more variables.

Teaching Methods: lectures, tutorials, homework, and problem-solving tests.

Requirements/Prerequisites: The students should have basics knowledge from Elementary Mathematics and Linear algebra.

Assessment: permanent control during the semester including homework and written exams, and written exam in the semester's end on topics from tutorials and on topics from lectures.

Registration for the exam: coordinated with the lecturer and student Service Department

WORKSHOP ON MATHEMATICAL ANALYSIS

Semester: 2-nd semester

Course Type: Tutorials

Hours per week /FS/SS: 2 tutorial hours /FS

ECTS credits: 2,0 credits

Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, South-West University "Neofit Rilski" – Blagoevgrad

Course Status: Compulsory course in the B.S. Curriculum of „Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Short Description: The education of that discipline includes some of the basic notations in Mathematical Analysis, and the included topics are analyzed and implemented with the help of basic software.

Course Aims: The purpose of this course is to introduce students with the opportunity to use modern methods and tools for solving problems of Mathematical Analysis.

Teaching Methods: tutorials, homework and tests.

Requirements/Prerequisites: The students should have basic knowledge in Mathematical Analysis.

Assessment: permanent control during the semester including two homework and two tests, or exam in the semester's end.

Registration for the exam: coordinated with the lecturer and student Service Department

DATABASES

Semester: 2 Semester

Course type: lectures and labs

Hours per week: 2 hours lectures, 2 hours labs

ECTS credits: 5.5 credits

Assessment: exam

Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad

Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Short Description:

The course training includes the study of:

- logic and fundamentals of databases;
- physical bases of databases;
- relational approach;
- proper languages;
- analysis of relational systems.

Course Objectives: Students will acquire knowledge of basic databases, methods of building and normalizing databases.

Teaching Methods: lectures and exercises.

Requirements/Prerequisites: Basic knowledge of: linear algebra and set theory is required**.**

Assessment: written exam

Registration for the course: automatic (compulsory course).

Registration for the exam: in agreement with the teacher and the department of student education.

MATHEMATICAL LOGIC

Semester: 2 semester

Course type: lectures and lab

Hours per week: 2 hours lectures + 1 hour lab

ECTS credits: 4.0

Assessment: exam

Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad,

Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Short Description: The course in mathematical logic aims to acquaint students with the basic concepts and results of pre-emptive and predicate logic, and adjective and predictive calculus. Specific first-order theories are considered.

Course Objectives: The course in mathematical logic aims to introduce students to the development of concepts and methods of mathematical logic in the context of development in mathematics.

Teaching Methods: conversations, demonstrations, problem solving.

Requirements/Prerequisites: Basic knowledge of mathematics.

Assessment: The written exam includes solving problems and answering questions from the syllabus of the course.

Registration for the course: automatic (compulsory course).

Registration for the exam: in agreement with the teacher and the department of student education.

OBJECT-ORIENTED PROGRAMMING

Semester: 2 semester
Course type: lectures and labs
Hours per week: 2 hours lectures + 2 hours lab
ECTS credits: 5.5 credits
Assessment: exam
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad,
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The course is designed to introduce students to the basics of object-oriented programming. It is a natural extension of the Introduction to Programming discipline. C ++, a modern, multi-language language, is selected. The basic principles of visual programming in different environments are discussed without going into detail. The course is basic to the subject of computer science and is necessary for better acquisition of many other disciplines included in the curriculum. Good understanding of the subject`s matter is essential in determining the qualification of a future IT specialist.
Course Objectives: The main goals and objectives for the students in the course are the following:

- to develop algorithmic thinking;
- to master the data structures that can be processed using a computer;
- to develop logically the individual steps in the solutions of the tasks;
- to be able to use basic programming techniques;
- to master the methods and tools of object-oriented programming in a visual programming environment;
- to master some of the classic algorithms, as well as to create their own algorithms;
- to get accustomed to good programming style;
- to learn the basic principles of software development.

Teaching Methods: The lectures are illustrated with lecture boards, slides, presentations, multimedia projector and laboratory work using the available computer equipment located in the faculty and separated in several computer rooms. The available computer equipment meets the modern requirements and is sufficient for the normal conduct of all laboratory exercises. During the seminars, tasks related to the development of algorithms for computer programs written in C ++ are solved and discussed.
Requirements/Prerequisites: The course is a continuation of the course Introduction to Programming. Students must have basic mathematical knowledge.
Assessment: Current control is carried out during laboratory sessions during the semester by two control tests and coursework – the first is set by the lecturer, the second is designed and formulated by the student according to their interests (1/3 of the final score). The course ends with a written exam on the course material (2/3 of the final grade).

Registration for the course: automatic (compulsory course)
Registration for the exam: in agreement with the teacher and the department of student education.

FOREIGN LANGUAGE 2

Semester: 2 semester
Course type: lab
Hours per week: 2 hours exercises
ECTS credits: 2.0 credits:
Assessment: ongoing assessment
Department: Faculty of Philology, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The course "English Language" introduces students with the basics of English - grammar and vocabulary. The covered topics include phonetics, spelling, the parts of speech, verb tenses and syntax in English.
Course Objectives: The purpose of the course is to provide students with knowledge of grammar rules and basic lexical knowledge; to meet the minimum requirements for written and spoken English language; to gain the ability to understand and use the common computer terminology.
Teaching Methods: Lab
Requirements/Prerequisites: Minimum initial knowledge from high school would serve as a basis for upgrading new knowledge and skills.
Assessment: ongoing assessment
Registration for the course: it is necessary to apply to the department at the end of current semester. **Registration for the exam:** in agreement with the teacher and the department of student education.

DIFFERENTIAL EQUATIONS

Semester: 3 Semester
Course type: lectures + exercises
Hours per week: 2 hours lectures + 2 hours exercises
ECTS credits: 6.0 credits
Assessment: exam
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The course contains a wide range of mathematical topics and problems of differential equations, known and established by the teaching practice in the world (introduction to the history and quantitative theory of differential equations, examples and problems, leading to differential equations, as well as elements of nonlinear dynamics, from

variational dynamics calculations, etc.). The course provides basic mathematical knowledge of the mathematical description of the evolution of processes of different nature, required in the activity of each teacher of mathematics and informatics, and in the design of the models in the natural sciences in the next semesters.

The course is part of the package of the basic courses in higher mathematics, adapted primarily to the natural sciences – with practical focus and visualization. The course consists separate modules and mostly attractive and well thought-out color computer animations, graphics, drawings, formulas. For each section there are appropriately selected examples and exercises. It is possible to change problem parameters, initial conditions, etc. In most tasks, automatic control (or self-control) is provided, which is a well-designed test related to the specific task and theory.

Course Objectives: The proposed course aims to provide students with generally accepted and necessary mathematical knowledge of differential equations and their applications that describe the dynamics of processes, not only in natural, but also in economic and social processes.

Teaching Methods: Lectures and exercises. Multimedia course.

Requirements/Prerequisites: The course requires the advance knowledge of "Mathematical Analysis I and Mathematical Analysis II" and an introductory Linear Algebra and Geometry course from the first semester.

Assessment: written exam /it is possible to increase your grade with up to 1 point with the results from the ongoing assessments, midterm tests, and participation in the classroom/.

Registration for the course: automatic (compulsory course).

Registration for the exam: in agreement with the teacher and the department of student`s education.

SCHOLAR COURSE OF EDUCATION IN MATHEMATICS-1

Semester: 3 semesters

Course Type: lectures and tutorials

Hours per Week/FS/SS: lecture hours, tutorials hours per week/FS

ECTS Credits: 6.0 credits

Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad

Course Status: Compulsory course in the B.S. Curriculum of „Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Course Description: The construction and development of the notion "number" is a difficult process not only for its mathematical and philosophical character, but for its educative character, too. The course "Scholar course of education in mathematics-1" for the students from second course in specialty "PEMIIT" follow the development of the4 notion "number", which is known from the course "Bases of the Arithmetic". This course formulates the basic principles of Algebra – commutative, associative and distributive; idempotents (neutral elements); the operations addition and multiplication of natural numbers H. on the base of the operations addition and multiplication, the course defines the respective orders. It lists the basic properties of the linear order – each set of natural numbers is limited from below,

Archimedean principle, the method of the mathematical order and etc. the course considers the question about the division of the natural numbers and the notion "prime number". All of this illustrated by concrete examples. The number in different cardinal (countable) systems.
In this course we show that each two natural numbers a, b $\in$ א the equations a+x=b and a x=b do not have solutions in the semiring of the natural numbers א. This lead to the necessity of enlargement of the semiring א to the ring of the integer numbers Z, to the semifield of the fraction Q_t, and finally to the field rational numbers Q. The course makes clear the validation of the basic properties of the introduced orders in the semiring of the natural numbers, for each of mentioned above structures. All of this is illustrated by appropriate example and problems. The most of the school hours is spared for the field of the real numbers and respective problems, such as quadratic equations and inequality, systems of equations and inequality, some of them with irrational expressions, some equivalent expressions with the collaboration of a special function like exponential, logarithmic, trigonometric and etc. out auditorium work for this course include homework, course tasks, work in library and computer room, consultation, preparation for test-paper, assimilation of the lection materials and etc. the proportion between auditorium and out auditorium work is **60:120.**
Course Aims: The introduced course of lections and tutorials shows the status of the mentioned above material, which is taught in a school course in Mathematics. It is developed on the base of well known algebraic structures. Students should learn this basic structures and problems which can be solved in them. With the help of the obtained knowledge and skills students should receive a complete canonical form of an algebraic equation or system of algebraic equations, using possible equivalent transformations.
Teaching Methods: lectures and tutorials.
Requirements / Prerequisites: Higher Algebra, Bases of the Arithmetic.
Assessment: written final exam
Registration for the Course: by request at the end of the current semester
Registration for the Exam: coordinated with lecturer and Student Service Department
Abbreviation: FS: Fall Semester/ SS: Spring Semester

WORKSHOP ON SCHOLAR COURSE OF EDUCATION IN ALGEBRA AND ANALYSIS

Semester: 3 semesters
Course Type: lectures and tutorials
Hours per Week/FS/SS: 2 tutorials hours per week/FS
ECTS Credits: 2,0 credits
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of „Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Course Description: The construction and development of the notion "number" is a difficult process not only for its mathematical and philosophical character, but for its educative character, too. The course "Scholar course of education in Algebra and analysis" for the students from first course follow the development of the 4 notion "number", which is known

from the course “Bases of the Arithmetic”. This course formulates the basic principles of Algebra – commutative, associative and distributive; idempotents (neutral elements); the operations addition and multiplication of natural numbers H. on the base of the operations addition and multiplication, the course defines the respective orders. It lists the basic properties of the linear order – each set of natural numbers is limited from below, Archimedean principle, the method of the mathematical order and etc. the course considers the question about the division of the natural numbers and the notion “prime number”. All of this illustrated by concrete examples. The number in different cardinal (countable) systems.
In this course we show that each two natural numbers a, b $\in$ א the equations a+x=b and a x=b do not have solutions in the semiring of the natural numbers א. This lead to the necessity of enlargement of the semiring א to the ring of the integer numbers Z, to the semifield of the fraction Q_t, and finally to the field rational numbers Q. The course makes clear the validation of the basic properties of the introduced orders in the semiring of the natural numbers, for each of mentioned above structures. All of this is illustrated by appropriate example and problems. The most of the school hours is spared for the field of the real numbers and respective problems, such as quadratic equations and inequality, systems of equations and inequality, some of them with irrational expressions, some equivalent expressions with the collaboration of a special function like exponential, logarithmic, trigonometric and etc. out auditorium work for this course include homework, course tasks, work in library and computer room, consultation, preparation for test-paper, assimilation of the lection materials and etc. the proportion between auditorium and out auditorium work **is ?**
Course Aims: The introduced course of lections and tutorials shows the status of the mentioned above material, which is taught in a school course in Mathematics. It is developed on the base of well known algebraic structures. Students should learn this basic structures and problems which can be solved in them. With the help of the obtained knowledge and skills students should receive a complete canonical form of an algebraic equation or system of algebraic equations, using possible equivalent transformations.
Teaching Methods: lectures and tutorials.
Requirements / Prerequisites: Higher Algebra, Bases of the Arithmetic.
Assessment: written final exam
Registration for the Course: by request at the end of the current semester
Registration for the Exam: coordinated with lecturer and Student Service Department
Abbreviation:
FS: Fall Semester
SS: Spring Semester

INTRODUCTION IN INFORMATION SYSTEMS AND TECHNOLOGIES

Semester: 3 semester
Type of Course: Lectures and tutorials in computer lab.
Hours per week: 2 hours lectures and 1 hours tutorials in computer lab/autumn semester.
ECTS credits: 4 credits
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” - Blagoevgrad,

Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Course description: The course involves basic concepts as information, data, knowledge, information system, business information systems, hardware and software components od IS ets. The problems related to ICT jobs, copyrights and law issues in ICT.

Objectives: The student should obtain basic knowledge in area of IT and IS:

Methods of teaching: lectures, tutorials, discussions, project based method.

Pre - requirements: No (Introductory course)

Assessment and Evaluation

Ongoing assessment (projects + practical work) - 60%

Final Test- 40%

The course is successful completed with at least 65% of all scores.

Registration for the Course: not required (core course)

Registration for the Exam: coordinated with the lecturer and the Student Service Office

SCHOOL COURSE IN COMPUTER MODELING AND INFORMATICS

Semester: 3rd semester

Course Type: Lectures /L/, Laboratory Exercises /LE/

Hours (weekly): 2 hours L + 2 hours LE

Credits: 6.0 credits

Assessment: Exam

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

Status of the Discipline in the Curriculum: Compulsory course in the curriculum of the specialty "Pedagogy of Teaching in Mathematics, Informatics and Information Technologies."

Course Description: Covers key topics from the content of school courses in informatics and IT. Includes issues related to fundamental concepts in informatics such as information, algorithm, software, and hardware. Topics included in the informatics and IT curricula for various school levels – primary, lower secondary, and upper secondary – are discussed. The course also lays the foundation for specialized informatics and IT training at the high school level.

Course Objective: This course is designed to prepare students to work as teachers in alignment with the state and trends in the development of informatics and IT education in secondary schools. Upon completion of the course, students should be able to:

- Understand the development of informatics and computer modeling education in secondary schools.
- Know and interpret curricula in informatics and computer modeling and information technologies;
- Use programming languages studied in secondary schools;
- Solve problems using computer modeling and information technologies;

Teaching Methods: Lectures, laboratory exercises, problem-based and project-based learning.

Prerequisites: Basic knowledge in the Methodology of Teaching Informatics, Information Technologies, and Programming.

Assessment: Written exam – includes a test and solving practical tasks on a computer. The final grade is formed based on the following scheme: 60% from continuous assessment and 40% from the final exam.

Students with a continuous assessment score below average (3.00) must complete the missing components during or outside the examination session before taking the written exam.

Enrollment in the Course: Automatically (compulsory course)

Enrollment for the Exam: In coordination with the lecturer and the Academic Affairs Office.

PSYCHOLOGY

Semester: 3 Semester

Course type: lectures, lab

Hours per week: 2 hours lectures, 2 hours seminar exercises

ECTS credits: 6 credits

Assessment: exam

Department: Psychology, Faculty of Philosophy

Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Short Description: The discipline Psychology has a total of 45 hours, of which 30 hours lectures, 15 hours lab and 80 hours self-study. It introduces students to the essence of the major areas of psychology, their importance for pedagogical systems; cognitive mental functions and their role in training; the sociopsychological characteristics of the ages and the professional position of the teacher. It enables students to acquire a certain system of theoretical knowledge in the field of Psychology, to comprehend them in accordance with the modern requirements of pedagogical practice, to acquire skills for their application in specific situations in accordance with age, to form a positive stereotype for pedagogical activity with psychological determinism.

The course in Psychology is divided into the following three modules:

The first module – Theoretical-historical and introductory problems of Psychology, which introduces students to the process of distinguishing psychology as an independent science, the main theoretical and methodological issues that are developed in it and psychic functions.

The second module – Theoretical and applied problems of age, presents to the students with the basic theoretical assumptions about the psychogenesis of the person, the need to periodize it; acquaintance with the mental characteristics of each age period and their importance in the process of education and training.

The third module – Current Issues in Educational Psychology, dedicated to the assimilation of information on the nature of the main and leading activities, their importance during each age period, the role of the educator in the implementation of systematic training.

Teaching Methods: lecture (introductory, traditional, summarizing, selective) discussion, exam training.

Assessment: All assessments are based on written works that are stored within the timeframe specified by the Education Regulations. They are subject to control by the relevant authorities.

MATHEMATICAL OPTIMIZATION

Semester: 4 Semester
Course type: lectures and labs
Hours per week: 2 hours lectures and 2 hours exercises.
ECTS credits: 5.5 credits
Assessment: exam
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Course Objectives: The purpose and main task of the course Mathematical Optimization is to provide students with knowledge of basic theoretical results and methods for solving different classes of optimization (extreme) problems.
The question of the existence of a solution to extreme problems is considered. The main results and approaches for solving nonlinear optimization problems are presented: John's theorem, Lagrange multiplier theorem, general nonlinear optimization theorem. The study of and on the basics of convex analysis and the representativity of sets is included: convex sets, convex envelope of sets, Radon theorem and Heli theorem, sum of sets and multiplication of set by number, projection of a point on set, separation of convex sets, reference hyperplanes, dimension of convex sets, endpoints and Minkowski - Crane - Milman theorem, cones, conjugate (polar) cones, convex cones representation, convex sets representation, multilateral sets, convex functions derived in a direction sub-gradients and sub-differentials, differentiable convex function. After this preliminary preparation, we present the main results of convex optimization: the Kun-Tucker theorem, the differential form of the Kun-Tucker theorem. The topic of quadratic optimization is also covered.
The seminar exercises and laboratory classes provide the study of the theory and methods of linear optimization: general and canonical linear optimization problem, geometric method for solving two-dimensional linear problems, simplex method, artificial basis method (M-method) for solving the canonical problem with unknown initial basis, ambiguity in linear optimization; classical transport problem, finding an initial support plan, distribution method and method of potentials for solving the transport problem, integer transport problem, transport problems with prohibitions, task for assignments. Matrix games are studied on this basis: a minimax theorem (by John von Neumann), a geometric method for solving games 2 x 2, 2 x n, m x 2, as well as the relationship between matrix games and linear optimization.
Software products that implement the methods are also used.
Expected results: knowledge of the basic theoretical concepts, application of the studied methods for solving problems, programming of some of the methods.
Self-study for the course includes: mastering the lecture material, homework, coursework, working in a library, working in a computer room, preparing for control work and more.

The study of the subject requires basic knowledge of Mathematical Analysis, Linear Algebra and Analytical Geometry.

OPERATING SYSTEM

Semester: 4 Semester
Course type: lectures and exercises
Hours per week: 2 hours lectures and 2 hours exercises.
ECTS credits: 5.5 credits
Assessment: exam
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The course introduces students to the history, construction and operation of operating systems. The study material includes an introductory part – an overview of computer and operating systems. Following are questions from process organization and management, memory management, single and multi-processor scheduling. Topics for organizing input and output, disk planning, organizing, and working with the file system are a must-have for any OS course. We end with distributed processes and security
Course Objectives: Students are introduced to the theoretical foundations of operating systems.
Tasks - Forming Habits for

- Working with different operating systems.
- Programming in OS environment.

Teaching Methods: lectures, discussions and exercises
Requirements/Prerequisites: none (basic course)
Assessment:

- Ongoing control - 70% of the assessment
- Final test 30% of the evaluation

The course is considered as successfully completed with a minimum of 65% of the maximum score.
Registration for the course: automatic (compulsory course)
Registration for the exam: in agreement with the teacher and the department of student education.

SCHOOL COURSE OF MATHEMATICS-2

Semester: 4 Semester
Course type: lectures and lab
Hours per week: 2 hours lectures and 2 hours seminar exercises
ECTS credits: 7.5 credits
Assessment: exam

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

Course Status: Compulsory course in the B.S. Curriculum of “Pedagogy of Teaching of Mathematics, Informatics and Information Technology”.

Short Description: The course covers the following geometric transformations: equality, similarity, affinity. Basic topics include face of a polygon and a tetrahedron.

Course Objectives: Students will acquire the theoretical and practical background needed to teach geometry in schools.

Teaching Methods: lectures, lab, consultations, homework and tests.

Requirements/Prerequisites: Basic knowledge of geometry, studied during school years.

Assessment: Written exam on seminar exercises and on theoretical material during the lectures.

Registration for the exam: In agreement with the teacher and the department of student education.

PRACTICUM FOR SOLVING PROBLEMS FROM THE SCHOOL GEOMETRY COURSE

Semester: 4th semester

Course type: Seminar classes (S)

Hours (weekly): 2 seminar hours

Number of credits: 2.0 credits

Assessment: Ongoing assessment

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

Status of the course in the curriculum: Compulsory course in the curriculum of the specialty "Pedagogy of Teaching Mathematics, Informatics and Information Technologies."

Course description: The formation and development of the concept of number is difficult both in its mathematical and philosophical essence, as well as in its educational and instructional aspects. Following the familiar construction of the number concept from the foundations of arithmetic, the course “Practicum for Solving Problems from the School Geometry Course” (PSPSGC) for students in "PTMIIT" – 8 semesters, full-time study, begins with the formulation of the basic algebraic laws – commutative, associative, idempotent (neutral) elements in the operations of addition and multiplication, as well as the distributive law combining the two operations on the natural numbers $\mathbb{N}$.

Based on the operations of addition and multiplication, the respective orders are defined. The main properties of linear order are listed – the lower boundedness of every set of natural numbers, the Archimedean property, etc., as well as the method of mathematical induction related to both orders. The question of divisibility of natural numbers and the concept of prime number is also considered. All of this is illustrated with specific examples. The question of writing a given natural number in different numeral systems is also examined.

Once it is shown that for any two natural numbers a and b, the equations $a + x = b$ and $a \times x = b$ in the semiring of natural numbers $\mathbb{N}$ have no solutions, the necessity of extending the semiring $\mathbb{N}$ to the ring of integers $\mathbb{Z}$, the semi-field of fractions $\mathbb{Q}_t$, and finally to the field of

rational numbers $\mathbb{Q}$ is clarified. For each of these structures, the validity of the main properties of the orderings introduced in the semiring of natural numbers is emphasized. All of this is illustrated with corresponding examples and tasks.
Most of the time in the course schedule is dedicated to the field of real numbers and the respective problems in that field – quadratic equations and inequalities, systems of equations and inequalities, including irrational expressions, and equivalent forms involving special functions such as exponential, logarithmic, trigonometric, and others.
Out-of-class workload: for the course includes homework assignments, coursework, work in libraries and computer labs, consultations, preparation for tests, mastering the lecture material, and more.
Course objective: Students should learn and comprehend the fundamental concepts, operations, and orders in the different extensions of the concept of number, as well as successfully use methods for solving the corresponding equations, inequalities, and systems of equations and inequalities in these extensions.
Teaching methods: Lectures, seminar exercises, consultations, homework assignments, coursework, written tests.
Prerequisites: Students are expected to have a good knowledge of the high school mathematics curriculum.
Assessment: Written exam based on seminar exercises and lecture material.
Exam registration: Students coordinate desired exam dates with the instructor within the announced calendar schedule for the examination sessions.

SCHOOL COURSE IN INFORMATICS AND INFORMATION TECHNOLOGIES

Semester: 4 Semester
Course type: lectures, exercises
Hours per week: 2 hours lectures, 2 hours exercises
ECTS credits: 5.5 credits
Assessment: exam
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The course is designed to give students an insight intro to the status and trends of the development of computer science and IT education in high school. It covers the core modules of the content of the school courses in computer science and IT.
Included are questions related to basic concepts in computer science such as: information, algorithm, software and hardware.
Course Objectives:
Upon completion of the course, students should be able to:
- To be familiar with the development of secondary school education in the subjects of computer science and IT.
- Knowledge of IT and IT curricula;

- Use programming languages taught in high school;

Teaching Methods: lectures, discussions, exercises and a project.

Requirements/Prerequisites: Students must have studied the following subjects, Operational Systems, Programming Languages, Data Structures, Databases, Discrete Mathematics, Computer Networks.

Assessment:

- practical work - 60%
- Written exam - 40% of the grade

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

Registration for the exam: in agreement with the teacher and the department of student education.

PEDAGOGY

Semester: 4 Semester

Course type: lectures and seminar exercises

Hours per week: 2 hours lectures, 2 hours seminar exercises

ECTS credits: 6.0 credits

Assessment: exam

Department: Department of Pedagogy, Faculty of Pedagogy

Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Short Description: The curriculum offers specialized pedagogical knowledge, differentiated into two main modules: Theory of Education and Theory of Learning. It is intended for students in the field of Pedagogy of Teaching in ..., which presupposes its reduced profile and type, without depriving itself of the opportunity to offer a deep reading of pedagogical knowledge.

Course Objectives: The purpose of the discipline training is to acquire knowledge and develop competencies for their pedagogical use. The discipline offers a wide range of knowledge in the field of pedagogical such as educational and didactic phenomena, events, situations, as well as educational design related to new information and communication technologies. Main tasks of training:

1. Orientation in pedagogical issues and mastering the conceptual apparatus of science pedagogy

2. Developing a set of professional competences for pedagogical competence and professional creative thinking.

3. Broad and specialized pedagogical competence through situational and reflective thinking in the field of pedagogical knowledge and its applied aspects. Course content:

The content of the discipline includes 30 hours of lectures and 30 hours of family-based exercises, the main problematic framework of which is related to the problems of upbringing and training as a professional task in specialized social institutions such as the school, as well as the broad social resonance they may have in society. Both classical ideas of pedagogy and

up-to-date or avant-garde ideas, dictated by the change of scientific paradigms in the 20th century, have been used.

Teaching Methods and Assessment: Classical, heuristic and interactive teaching methods are used for students such as: Socratic talk and seminar, case study, educational theater, project method, business games, morphological analysis, koans, auto-trainings, psychodrama, methods for teaching lateral thinking, etc.

METHODS OF TEACHING INFORMATICS AND INFORMATION TECHNOLOGIES

Semester: 5 Semester

Course type: lectures, exercises

Hours per week: 2 hours lectures, 2 hours exercises

ECTS credits: 5.5 credits

Assessment: exam

Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad

Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Short Description: The course includes methods and principles of teaching computer science and IT in high school, planning and organization of computer science and IT lessons. Specificity of teaching the core modules of the IT and IT curricula.

Course Objectives:

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

- Define the goals of training in computer science and information technology. Know and apply the methods and principles of training.
- To plan the lesson activity.

Teaching Methods: lectures, discussion, exercises and a project.

Requirements/Prerequisites: Students must have studied Psychology, Pedagogy, Operating Systems, Programming Languages, Data Structures, Databases, Computer Networks, School of Computer Science and IT.

Assessment:

• course work – 30% of the assessment
• practical work – 30%
• written exam – 40% of the assessment

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

Registration for the exam: in agreement with the teacher and the department of student education.

CLASSROOM OBSERVATION IN INFORMATICS AND INFORMATION TECHNOLOGIES

Semester: 5th semester

Course type: Practicum – school observation

Hours (weekly): 1 hour of classroom observation
Number of credits: 1.5 credits
Assessment: Ongoing assessment
Department: Department of Informatics, Faculty of Natural Sciences and Mathematics, South-West University "Neofit Rilski" – Blagoevgrad
Status of the course in the curriculum: Compulsory course in the curriculum of the specialty "Pedagogy of Teaching Mathematics, Informatics, and Information Technologies."
Course description: Classroom observation is a type of practical training that includes observing and discussing school lessons. It is directly related to the course on methodology of teaching mathematics and informatics. The main focus during the observations is on the implementation of teaching principles, teaching methods, the organizational structure of the lesson, teacher–student communication, and others.
Before each observation session, students are divided into groups and each group observes a specific component of the lesson. After the observation, each group presents an analysis of the observed components. Both the strengths and weaknesses of the lessons are discussed.
Course objectives: Upon completion of the course, students should be able to:
• Analyze observed lessons;
• Develop a lesson plan on a given topic.
Teaching methods: Observation, discussion.
Prerequisites: Familiarity with the course "School Course in Informatics and IT," and knowledge from the course "Methodology of Teaching Informatics and IT," which runs concurrently with this course.
Assessment: The final grade is formed based on the following:
- Participation in discussions during the observations (30%)
- Notes and analyses of the observed lessons (50%)
- Submitted lesson plan in Informatics (10%)
- Submitted lesson plan in Information Technologies (10%)

The total points from all components are converted to a 100-point scale.
Grading scale:
- Excellent: 100%–92%
- Very Good: 91%–76%
- Good: 75%–60%
- Satisfactory: 59%–52%
- Fail: below 52%

If the student has a passing grade and 100% attendance, the practicum is recorded in their student logbook.
Exam registration: Not required. The final grade is determined based on the submitted analyses, lesson plans, and participation in classroom observation discussions

COMPUTER ARCHITECTURES

Semester: 5th semester
Course type: Lectures /L/, Seminar sessions /S/
Hours (weekly): 2 lectures + 1 seminar hour
Credits: 4.0 ECTS

Assessment: Exam
Department: Faculty of Engineering, South-West University “Neofit Rilski” – Blagoevgrad,
Status in the curriculum: Compulsory course in the curriculum of the “Pedagogy of Teaching Mathematics, Informatics and Information Technologies” program.
Description: The course "Computer Architectures" is designed for students in the bachelor's program of "Pedagogy of Teaching Mathematics, Informatics and Information Technologies."
The global Internet network can be considered a global computer – (practically) an inexhaustible computational power and an infinite information repository. Nowadays, it is hard to imagine any activity without network connectivity and access to these global resources. Whatever program you write, it must be able to “communicate” with the outside world – for example, to have open sockets (IP address: port), from which it can "listen" for requests from other programs over the network.
This makes it essential to acquire knowledge in computer networks and communications.
The course is related to computer systems and networks, the principles of building computer networks, and the functioning of the global Internet.
Objectives: To develop knowledge of the architectural aspects of modern computing systems and to familiarize students with modern computer systems (MCS).
Upon completion of the course, students should acquire knowledge about the architecture of computer systems – use of cache memory, virtual memory organization, I/O systems, internal bus communication organization, instruction pipeline execution, and RISC architectures.
Expected outcomes:
Students will become familiar with the functional and programming model of modern computer systems and their organization.
Assessment: Ongoing assessment during the semester (test and midterm) and a final written exam.
Course registration: Not required
Exam registration: Arranged with the course instructor and academic office

NUMERICAL METHODS

Semester: 5 Semester
Course type: lectures and labs
Hours per week: 2 hours lectures, 2 hours labs
ECTS credits: 5.5 credits
Assessment: exam
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of “Pedagogy of Teaching of Mathematics, Informatics and Information Technology”.
Short Description: Discipline training involves studying the basic numerical methods of mathematical analysis, algebra and differential equations. A detailed study of interpolation is envisaged as a way of approaching table-set functions; as well as another basic approach to function approximation is the root mean square approximation (least squares method). Special emphasis is placed on the topics of numerical differentiation and numerical integration – the

quadrature formulas of Newton-Coates and Gauss. It is envisaged to study the basic methods for numerically solving nonlinear equations. Another important topic is the numerical solution of systems of linear equations, which are obtained in many mathematical, physical, technical, etc. tasks. Methods for numerical solution of the Cauchy problem for ordinary 1st order differential equations, for numerical solution of the boundary value problem for 2nd order ordinary differential equations and variational methods for solving operator (including differential) equations are studied.

Course Objectives: Students must gain knowledge of the basic numerical methods of mathematical analysis, algebra and differential equations that find application in solving various problems.

Teaching Methods: lectures, seminar exercises and labs

Requirements/Prerequisites: Basic knowledge of mathematical analysis, linear algebra, analytical geometry, differential equations

Assessment: written exam on tasks / or release on the basis of two control works / (assessment is 30% weight) and theory on two topics (assessment is 30% weight); current control: two homeworks (20% weight rating) and two coursework (weights
20%)

Enrollment for course training: no special enrollment is required

Registration for the course: automatic (compulsory course)

Registration for the exam: in agreement with the teacher and the department of student education

GEOMETRY

Semester: 5 Semester

Course type: lectures and lab

Hours per week: 2 hours lectures and 2 hours seminar exercises

ECTS credits: 5.5 credits

Assessment: exam

Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad

Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Short Description: The course training involves the study of basic issues in classical differential geometry of lines, swarms, and surfaces in three-dimensional real Euclidean space.

Course Objectives: Students must acquire knowledge and skills in applying differential geometric methods for studying geometric objects.

Teaching Methods: lectures, lab, consultations, homework and supervision.

Requirements/Prerequisites: Knowledge of Analytical Geometry, Mathematical Analysis and Differential Equations is required.

Assessment: Written exam on seminars and theoretical material from lectures.

Registration for the exam: in agreement with the teacher and the department of student education.

PROBABILITY AND STATISTICS - METHODOLOGY AND TECHNOLOGIES

Semester: 6 Semester
Course type: lectures, exercises
Hours per week: 2 hours lectures, 2 hours exercises
ECTS credits: 6 credits
Assessment: exam
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The course was developed as a base course in probability and statistics. The purpose of the course is to introduce students in the field of Mathematics and Informatics during their study with some basic ideas and methods of probability theory, in order to use them in modeling processes and phenomena in the field of natural sciences and computer analysis, as well as elementary modeling of social processes and phenomena in society and life.
With the help of this course, students will acquire knowledge of stochastics useful for their learning activity as well as their future experimental or scientific activity;
The course provides seminars and labs to illustrate the learning process and gain practical skills to work with MS-Excel extensions, as well as application packages.
Course Objectives: Upon completion of the course, students will be acquainted with the basic concepts of probability and statistics and their relationship with:

- Decision theory
- Evaluation theory
- Decision theory for small samples
- Test hypotheses about the type of empirical distribution.

Students should gain knowledge of the interdisciplinary nature of stochastics and discover the connections between Mathematics-Informatics-Physics-Economics and many other scientific fields.
Teaching Methods: seminar, discussion, laboratory work.
Requirements/Prerequisites: Students must have studied the subjects of Mathematical Analysis and Information Technology
Assessment:

- Ongoing control – 60% of the assessment
- Written exam – 40% of the grade

The course is considered as successfully completed with a minimum of 65% of the maximum score.
Registration for the course: automatic (compulsory course).
Registration for the exam: in agreement with the teacher and the department of student education.

INTELLECTUAL PROPERTY PROTECTION

Semester: 6th semester
Course type: Lectures (L)
Hours (weekly): 2 lecture hours
Credits: 3.0 ECTS
Assessment: Exam
Department: Faculty of Law and History, South-West University "Neofit Rilski" – Blagoevgrad
Status in the curriculum: Compulsory course in the curriculum of the specialty "Pedagogy of Teaching Mathematics, Informatics, and Information Technologies."
Course description: This course focuses on the legal aspects related to the protection of intellectual property. Topics covered include the nature, subject, and role of intellectual property protection in modern technological relations and law, the stages in the historical development of IP protection, and the different types of legal sources that form the body of intellectual property law.
The course also explores the subjects and objects of intellectual property law. Special attention is given to inventions and the patents protecting them, copyright as a means of protecting works of science, literature, and art, authorship of various software products and databases, digitalization, networks, software, computer programs, internet piracy, e-commerce, and more.
Out-of-class workload: Includes research in the library and on the internet. The ratio of in-class to out-of-class work is 1:2.
Course objective: The course aims to provide students with a structured understanding of the fundamental principles of intellectual property protection.
Teaching methods: Lectures
Prerequisites: Minimal prior knowledge from basic school education is sufficient as a foundation for acquiring new knowledge and skills.
Assessment: Exam
Course registration: A formal application must be submitted to the academic office at the end of the current semester.
Exam registration: In coordination with the instructor and the academic office.

COMPUTER SECURITY

Semester: 6 Semester
Course type: lectures and labs
Hours per week: 2 hours lectures and 1hour lab
ECTS credits: 4,5 credits
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU “Neofit Rilski” – Blagoevgrad
Status in the curriculum: Compulsory course in the curriculum of the specialty "Pedagogy of Teaching Mathematics, Informatics, and Information Technologies."

Short Description: This course introduces you to computer security. The contemporary risks of storing and exchanging information and methods for protecting it (hardware and software) from breaking and unauthorized access are considered. The course provides a brief theoretical introduction to debugging codes and cryptographic systems. The main focus is on software and technical tools and methods for controlling access, computer security at various levels - personal, network and corporate, including security on social networks and cloud platforms.
Course Objectives: To provide students with the necessary basic knowledge of computer security and to acquire knowledge and skills to identify possible risks in specific systems and to apply various means of protection. The acquisition by students of additional advanced specialized training in the protection of information and computer systems in general.
Teaching Methods: Talk, demonstration, project work and teamwork.
Requirements/Prerequisites: Knowledge of computer architecture, discrete mathematics, network and system administration, programming, operating systems.
Assessment: Written exam
Registration for the course: it is necessary to apply to the department at the end of the previous semester.
Registration for the exam: In agreement with the teacher and the department of student education.

METHODS IN TEACHING MATHEMATICS – I

Semester: 6 Semester
Course type: lectures
Hours per week: 2 hours lectures
ECTS credits: 3.0 credits
Assessment: exam
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The course includes problems in the common methodology of teaching mathematics such as teaching mathematical concepts, theorems, proofs in the school mathematics course, builds different forms of problem solving skills.
Course Objectives: To prepare students to be able to teach mathematics at school.
Achieving this goal is completing the following objectives:
1. Mastering methods and tools that provide effective mastery of the basic mathematical information - concepts, axioms, theorems, proofs of theorems, problems and their solutions.
2. Familiarity with the specifics of the organization of the process of studying of mathematics, according to the specific structure of mathematical knowledge.
Teaching Methods: lectures, consultations and self-work.
Requirements/Prerequisites: knowledge of high-school mathematics, as well as knowledge of psychology and pedagogy.
Assessment: written exam.

Registration for the exam: in agreement with the teacher and the department of student education.

CLASSROOM OBSERVATION IN MATHEMATICS

Semester: 6th semester
Course type: Practical exercises (PE)
Hours (weekly): 1 PE hour
Credits: 1.5 ECTS
Assessment: Ongoing evaluation
Department: Department of Mathematics and Physics, Faculty of Natural Sciences and Mathematics, South-West University "Neofit Rilski" – Blagoevgrad
Status in the curriculum: Compulsory course in the curriculum of the specialty "Pedagogy of Teaching Mathematics, Informatics, and Information Technologies."
Course description: The course provides practical training for students. The classroom observation in mathematics takes place in a partner school. Under the guidance of a practice supervisor, students observe and analyze lessons at lower and upper secondary school levels. Each observed lesson is discussed (conferenced), highlighting its strengths and any mistakes made.
Course objective: To develop skills for analyzing observed pedagogical activities in a real classroom environment, including:

- identifying the topic, goals, and objectives of the lesson;
- recognizing the principles, forms, methods, and teaching aids used;
- evaluating the material and technical support for the educational process;
- assessing the pedagogical interaction with students.

Teaching methods: The main method of conducting the observation is through direct attendance of mathematics lessons, combined with the analysis of different pedagogical situations and activities.
The lecturer supervising the observation defines in advance the topic and didactic objectives for each session.
Students are required to take notes for every observed lesson and to submit analyses of three selected lessons. All notes must be submitted for the final assessment.
Assessment: Student evaluation follows the requirements of Ordinance №21/30.09.2004 on the implementation of the credit accumulation and transfer system. The ongoing grade is based on:

- participation in post-lesson conferences (20%);
- completeness and quality of lesson notes (20%);
- analysis of three observed lessons (60%).

Grading scale:

- Excellent: 100%–92%
- Very Good: 91%–76%
- Good: 75%–60%
- Satisfactory: 59%–52%
- Fail: Below 52%

A student who receives a passing grade and has 100% attendance will receive validation of the practice in their student record book.

STEM EDUCATIONAL TECHNOLOGIES IN TEACHING NATURAL SCIENCES, MATHEMATICS, AND INFORMATICS

Semester: 6th semester
Course type: Lectures and Laboratory Exercises
Hours (weekly): 1 lecture hour, 1 laboratory hour
Credits: 3.0 ECTS
Department: Department of Mathematics and Physics, Faculty of Natural Sciences and Mathematics, South-West University "Neofit Rilski" – Blagoevgrad,
Status in the curriculum: Compulsory course in the curriculum of the specialty "Pedagogy of Teaching Mathematics, Informatics, and Information Technologies."
Course description: The course introduces students to an educational environment – a STEM center – that enables visualization of various aspects of the curriculum through the implementation of innovative technologies and software solutions. It is aimed at future mathematics teachers to enrich the teaching process and bring real-world relevance to the classroom.
Course objective: The goal of the course is to familiarize students with the STEM environment, helping them develop creativity when working with students and prepare them for successful future careers in diverse fields. It aims to enhance their logical thinking, problem-solving skills, digital literacy, and emotional intelligence.
Teaching methods:

- STEM modeling methods
- Use of experiments and augmented reality in STEM education
- Blending of virtual data (audiovisual and multimedia content)
- STEM research approach
- Practical work and internet-based simulations
- STEM methods for hands-on activities using situational methods
- Simulating real-world problems
- Integration of traditional/standard teaching methods with STEM approaches

Assessment: The primary form of student knowledge assessment is a written exam. Knowledge and skills are graded using the Bulgarian six-point grading system:

- Excellent (6)
- Very Good (5)
- Good (4)
- Satisfactory (3)
- Poor (2)

Assessment procedures applied during the course include: ongoing assessment, continuous evaluation, and the final exam.
If a student receives a failing grade (“Poor”) from the ongoing assessment, they must meet additional criteria to achieve at least a “Satisfactory” grade before being allowed to take the final exam.

Course enrollment: Automatically enrolled (compulsory course)
Exam enrollment: Coordinated with the instructor and Academic Office

METHODS IN TEACHING MATHEMATICS - II

Semester: 7 Semester
Course type: lectures and exercises
Hours per week: 2 hours lectures and 2 hours exercises
ECTS credits: 6.0
Assessment: exam
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The course includes problems in the special methodology of teaching mathematics, namely the topics: functions, relations and operations, equations and inequalities, uniformities and similarities, vectors, geometric figures in the plane and space and their place in the school mathematics course.
Course Objectives: To prepare students for their future realization as teachers of mathematics, informatics and information technology.
Teaching Methods: lectures and exercises
Requirements/Prerequisites: Knowledge of high-school mathematics, as well as knowledge of psychology and pedagogy.
Assessment: written exam
Registration for the exam: in agreement with the teacher and the department of student education.

ONGOING TEACHING PRACTICE IN MATHEMATICS

Semester: 7th semester
Course type: Practical exercises
Hours (weekly): 2 exercise hours
Credits: 3.0 ECTS
Assessment: Ongoing evaluation
Department: Department of Mathematics and Physics, Faculty of Natural Sciences and Mathematics, South-West University "Neofit Rilski" – Blagoevgrad
Status in the curriculum: Compulsory course in the curriculum of the specialty "Pedagogy of Teaching Mathematics, Informatics, and Information Technologies."
Course description: The course *"Ongoing Teaching Practice in Mathematics"* prepares students for their future profession. Each student delivers two lessons – one in lower secondary level (grades 5–8) and one in upper secondary level (grades 8–12), while the rest of the group observes the lessons.
Course objective: The aim of the course is to help students develop an understanding of the structure of a mathematics lesson, to acquire skills in preparing and organizing a math lesson,

selecting and systematizing exercises for students, and evaluating both individual student performance and class progress.

Teaching methods: Practical exercises

Prerequisites: Students are expected to be familiar with the State Educational Standards (SES) and the content of the school mathematics curriculum, including what material is taught at each grade level and its complexity.

Assessment: Students must submit written lesson plans for the two lessons they deliver, as well as three written analyses of observed lessons. The final grade is based on:

- delivered lessons – 60%
- submitted lesson plans and analyses – 40%

CURRENT TEACHING PRACTICE IN INFORMATICS AND INFORMATION TECHNOLOGIES

Semester: 7 Semester

Course type: labs

Hours per week: 2 hours weekly

ECTS credits: 3.0 credits

Assessment: ongoing assessment

Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad

Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Short Description: The course "Current Teaching Practice in Informatics and Information Technologies" prepares students for their future profession. It is conducted after the lectures on Methods of Teaching Informatics and IT and Classroom Observation and meets the requirements for the practical training of students who receive a teacher qualification. The full implementation of the current practice provides the basis for the successful undergraduate pedagogical practice in informatics.

Course Objectives: The main objective of the course is to acquire the skills for planning, preparation and implementation of a lesson in computer science and information technology in a specific learning environment. Each student must prepare and deliver a minimum of 2 lessons per class. The rest of the students in the group prepare a lesson plan for themselves, watch and observe the lesson from their classmates and participate in the discussion.

Thus, there is an opportunity to compare the planned and realized lessons, to defend the proposed lesson plans and to generate new ideas.

Teaching Methods: practical exercises

Requirements/Prerequisites: Students should be familiar with the Methods of Teaching Informatics and the content of the school course in informatics: what course material is being taught and at what level.

Assessment: They present the plans of two lessons in informatics and two analysis of observed lessons in written form. The final grade is formed from the assessment of the thought lessons – 60%, and from the presented plans and analysis of the lessons – 40%.

INFORMATION AND COMMUNICATION TECHNOLOGY FOR TEACHING AND DIGITAL WORK

Semester: 7 Semester
Course type: lectures and labs
Hours per week: 1 hour lectures and 1 hour exercises
ECTS credits: 3.0 credits
Assessment: exam
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The curriculum is oriented towards mastering the modern tools and technologies applicable to education. The main features and applications of software packages in computer science and IT training are discussed. Emphasis is placed on the use of a variety of multimedia training products and the use of Internet technologies for research and development of teaching aids.
The training is supported by teaching materials published in the e-learning system maintained by the E-Learning Research Laboratory of the Faculty of Mathematics and Natural Sciences: www.e-learning.swu.bg
Courses Objectives and Expected Results:
Upon completion of the course, students should be able to:

- know the principles of using software products in computer science training;
- acquire knowledge and skills to work with tools for presenting study materials and creating interactive tests;
- be familiar with trends in the development of multimedia technologies in training;
- create their own multimedia teaching materials to support the learning process.

Teaching Methods: lectures, labs, discussions and practical problem solving.
Requirements/Prerequisites: No special knowledge is needed beyond those acquired in Computer Science and Information Technology courses from high school.
Assessment: ongoing assessment and practical exam (solving practical task in digital environment). Ratio ongoing assessment – 60% - practical exam 40%.
Registration for the exam: in agreement with the teacher and the department of student education.

NETWORK AND SYSTEM ADMINISTRATION

Semester: 7th semester
Course Type: lectures and labs
Hours (weekly)/WS/SS: 2 lecture and 2 labs per week / WS
ECTS Credits: 6 credits
Status in the curriculum: Compulsory course in the curriculum of the specialty "Pedagogy of Teaching Mathematics, Informatics, and Information Technologies."

Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad

Course Description: In this course are discussed the basic actions and problems related to network and systems administration of Linux and Windows based systems. The course is aimed at providing the necessary skills needed to perform nearly all important administration activities required to manage a Linux and Windows network and systems configuration, the basic setup and management of the most commonly used Internet services.

Course Objectives: The course is aimed at introducing to students the common concepts in network and systems administration by discussing the basic activities regarding the administration of a Linux and Windows network configuration.

Teaching Methods: Lectures, demonstrations, work on project and teamwork.

Requirements/Prerequisites: Needed basic knowledge of operating systems, programming, computer architectures, computer networks and communications.

Assessment: written final exam

Registration for the Course: the course is compulsory

TEACHER PRACTICE IN MATHEMATICS

Semester: 8th semester

Course type: exercises

Hours per week: 3 hours weekly

ECTS credits: 4.0 credits

Assessment: ongoing assessment

Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad

Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Short Description: The discipline "Teacher Practice in Mathematics" prepares students for their future profession. With the Rector's Order, students are allocated to a 10-week internship at school. They take three lessons each week and observe their colleagues for two hours. They must take 15 high and 15 mid-course lessons throughout the practice. The schoolteachers assist in the development of lessons and control the work of trainees at school. If the trainee is not prepared for the lesson, the base teacher and the principal have the right to request a termination of the traineeship.

Course Objectives: The purpose of the course is to prepare students for their chosen profession - to gain an understanding of the structure of mathematics lessons and skills for developing different types of mathematics lessons, to select and systematize the tasks offered to students, to evaluate the work of the individual student and class in general.

Teaching Methods: practical exercises

Requirements/Prerequisites: Students should be familiar with the Methods of Teaching Mathematics and the content of the school course in mathematics: what course material is being taught and at what level.

Assessment: They present the plans of lessons in mathematics in written form. The final grade is formed from the assessment of the 2-3 thought lessons /observed by the teacher practice trainer/ - 60%, and from the presented plans of the lessons – 40%.

TEACHER PRACTICE IN INFORMATICS AND INFORMATION TECHNOLOGIES

Semester: 8th semester
Course type: exercises
Hours per week: 3 hours
ECTS credits: 3.0 credits
Assessment: ongoing assessment
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The course "Teacher Practice in Informatics and Information Technologies" is included as compulsory. It is conducted after the lectures on Methods of Teaching Informatics and IT and Classroom Observation and meets the requirements for the practical training of students who receive a teacher qualification. The full implementation of the current practice provides the basis for the successful professional realization as a teacher in informatics.
Course Objectives: The main objective of the undergraduate pedagogical practice in informatics is the acquisition of competencies for the preparation and organization of full and effective training in informatics and information technology.
During the undergraduate pedagogical practice, students complete almost all activities of the computer science teacher. This allows, in addition to take several lessons, to familiarize themselves with the teaching documentation and to engage in various extracurricular activities of students.
The pre-graduation practice in informatics prepares the students for the practical exam (teaching a lesson) before a committee determined by an order of the Rector.
Teaching Methods: Practical exercises
Requirements/Prerequisites: Students should be familiar with the Teaching Methods in Informatics and IT and the content of the school computer science course: what course material is being taught and at what level.
Assessment: They present the plans of lessons in mathematics in written form. The final grade is formed from the assessment of the 2-3 thought lessons /observed by the teacher practice trainer/ - 60%, and from the presented plans of the lessons – 40%.

INCLUSIVE EDUCATION

Semester: 8th semester
Course type: lectures
Hours per week: 1-hour lectures
ECTS credits: 2

Assessment: exam
Department: Faculty of Pedagogy, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Short Description: The discipline broadens and enriches the pedagogical preparation of students with major problems of the development of students with special educational needs and the specifics of their education. Students are introduced to the optimal approaches for meaningful and procedural realization of the education of students with special educational needs, depending on their capabilities and needs.
Course Objectives: Students acquire sufficient competence for the basic characteristics of students with special educational needs, for the ways and means, forms and methods of correction-pedagogical interaction with them, for their social pedagogical problems, for the conditions that empower these students for active participation in the educational process and successful coping with the assigned learning tasks.
Teaching Methods: lectures, stimulation of active debate in subgroups, didactic games, case studies, planning and conducting mini-experiments to analyze the behavior of students with special educational needs at different moments of the lesson and extra-curricular activity.
Assessment: written exam.
Registration for the exam: in agreement with the teacher and the department of student education.

COMPETENCY-BASED APPROACH AND INNOVATIONS IN EDUCATION

Semester: 8th semester
Course type: Lectures (L), Seminar exercises (SE)
Hours (weekly): 2 lecture hours + 1 seminar hour
Credits: 4.0 ECTS
Assessment: Exam
Department: Faculty of Pedagogy, South-West University "Neofit Rilski" – Blagoevgrad
Course Status: Compulsory course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Course description: The course *Competency-Based Approach and Innovations in Education* emphasizes the importance of the competency-based approach in educational theory and practice, as well as the significance of innovation processes in the field of education. The focus is on improving the pedagogical environment and enhancing the efficiency and productivity of educational institutions. The course explores the role and essence of the competency-based approach in teaching, the types of competencies, and the core methodological strategies for developing key competencies. It also emphasizes the development of an innovation culture among students preparing to become future teachers. Students are expected to acquire knowledge, build skills, and develop competencies that allow them to act appropriately and professionally within the specific contexts of innovation in modern schools. The course highlights new pedagogical ideas, their implementation in real classroom settings, and their technological dimensions, including new approaches, forms, methods, and didactic and educational tools.

The training also aims to stimulate creativity in students and foster their professional and personal readiness to embrace, understand, and support innovations. It helps future teachers integrate an innovation culture into their overall professional pedagogical competence and equips them with strategies, didactic technologies, and methodological tools to develop students' key competencies throughout the educational process.

Course objective: To support students in understanding the issues related to the competency-based approach and innovation processes in education, and their specifics within school education.

The course also aims to develop students' innovation culture as a complex construct that includes knowledge, skills, attitudes toward innovation, readiness to adopt and assess innovative ideas, and the ability to contribute to the implementation of innovations with a projected positive impact on the pedagogical environment.

Teaching methods: Lectures, seminars, and extracurricular work

Prerequisites: Prior knowledge in linear algebra and mathematical optimization is useful.

Course enrollment: Automatically enrolled (compulsory course)

Exam registration: Coordinated with the course instructor and Academic Office

OPTIONAL COURSES

I. Pedagogical, Psychological, Educational-Management, and Subject-Specific Didactic

DIGITAL COMPETENCE AND DIGITAL CREATIVITY

Semester: 8th semester
ECTS credits: 3.0 credit
Hours per week: 2 lecture hours per week
Assessment: exam
Course Status: Optional course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Methodical guidance: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University "Neofit Rilski" – Blagoevgrad
Description of the course: The "Digital Competence and Digital Creativity" course aims to increase the knowledge and skills of future educators about modern information and communication technologies (ICT) and their use during the teaching and the learning process.
The course consists of two main modules: Digital competence and digital creative. Digital competence includes a variety of knowledge, skills, and attitudes in several areas, including the creative use of digital technologies, the safe and responsible use and provision of data. Digital creativity is related to the possibility of using digital technologies for various creative activities. All of this is important not only for learners but also for learners and contributes to the confident and competent use of digital technologies in education, in the workplace, and even in everyday life
Content of the course: Basic knowledge and skills related to digital competence; Digital creativity as a means to improve the learning process; Browsers, portals and ways to search for information on the Internet; E-mail and spam; Digital communication - video calls and real-time text messaging (chat); Blogs and discussion groups (newsgroups); Privacy, social media and cyberbullying; Cyberattacks and cybersecurity; Digital libraries as a means of enriching the teaching content; Types of e-learning and e-learning environments; Augmented, virtual and mixed reality in learning; Cloud technologies as sharing learning content tools; Machine learning and artificial intelligence in the learning process; Copyright and licensing agreements; Web development.
Training and assessment technology: The lectures are illustrated with presentations and practical tasks that demonstrated the way of applying the teaching material.
The assessment is based on an exam test after the end of the course. During the course, the students should be doing various practical tasks, the evaluation of that participate in the final assessment.

DEVELOPMENT OF LESSONS FOR E-LEARNING

Semester: 8th semester
ECTS credits: 3.0 credits
Hours per week: 2 lecture hours per week
Assessment: exam
Methodical guidance: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University "Neofit Rilski" – Blagoevgrad
Course Status: Optional course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Description of the course: In the 21st century, teachers should have not only pedagogical knowledge but also have high digital literacy. They should be able to integrate the learning process in a digital environment. This is not always an easy task, as the market is crowded with software products that provide similar capabilities but often require different levels of computer literacy. On the other hand, the learning resources that can be found on the Internet are not always free, reliable, or suitable for the separate age group of students. Therefore, teachers should be able to select the appropriate software to create their teaching resources for e-learning.
Extracurricular activities in the discipline include work in the library, work on the Internet and development of coursework.
Content of the course: E-learning - history, present and future; Modern computer devices and their application as a learning tool; Synchronous and asynchronous e-learning systems; Creating and working with vector graphics; Creating and working with raster graphics; Word processing systems; Graphics, tables, images, and templates in word processing systems; Working with spreadsheets; Developing of documents for e-learning; Creating and editing interactive multimedia presentations; Developing and publish a video.
Training and assessment technology: The lectures are illustrated with presentations and practical tasks that demonstrated the way of applying the teaching material.
The assessment is based on an exam test after the end of the course. During the course, the students should be doing various practical tasks, the evaluation of that participate in the final assessment.

PEDAGOGICAL INTERACTION IN A MULTICULTURAL ENVIRONMENT

Semester: 8th semester
Course Type: Lectures
Hours (per week): 2 hours lectures
Credits: 3.0 credits
Assessment: Exam
Department: Faculty of Pedagogy, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Optional course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Brief Description: This academic discipline provides bachelor's degree students with knowledge about the specificities of pedagogical interaction in a multicultural environment. It

has an interdisciplinary character, as it combines knowledge from various scientific fields (pedagogy, culturology, social psychology, ethnology, etc.).
The educational content clarifies the essence, characteristics, and specificities of pedagogical interaction in a multicultural environment, problematizes issues of cultural difference in terms of their manifestations in the school environment, argues the importance of intercultural education for harmonizing cultural differences in the educational space and the intercultural upbringing of adolescents, and discusses specific problems in the process of educational integration of children and students from minority ethnocultural groups. Based on this, pedagogical strategies, approaches, and methods for achieving effective pedagogical interaction in a multicultural environment are outlined.
Course Aims and Objectives: The main goal of studying this discipline is for students to master competencies for effective pedagogical interaction in a multicultural environment.
Teaching Methods: Lecture, discussion, debate on a pre-set or emerging problem during the lecture, modeling, demonstration, analysis and discussion of problematic situations, analysis of curricula, textbooks, and learning aids, etc.
Assessment: The final grade takes into account the results of ongoing assessment and the grade from the written exam.
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.

MANAGEMENT OF EDUCATIONAL INSTITUTIONS

Semester: 8th semester
Course Type: Lectures
Hours (per week): 2 hours lectures
Credits: 3.0 credits
Assessment: Exam
Department: Faculty of Pedagogy, SWU “Neofit Rilski” – Blagoevgrad
Course Status: Optional course in the B.S. Curriculum of “Pedagogy of Teaching of Mathematics, Informatics and Information Technology”.
Brief Description: This discipline allows students to enhance their level of professional competence by enriching their administrative and legal literacy. The learning process presents and discusses problems related to: the structure, organization, and philosophy of education; carrying out professional activities in accordance with regulatory requirements and regulations for public participation in the institution's activities; understanding the relationship between the regulatory framework and the institution's autonomy (regarding opportunities for independent decisions in selecting and introducing new aspects in the organization and content of the educational process), based on regulatory documents in the Republic of Bulgaria, which is a prerequisite for lawful, responsible, calm, and secure management of the institution. The course enriches students' professional culture, their knowledge in the field of management, law, and administration of activities in the educational institution, guiding them towards the necessity of conducting a management process in accordance with regulatory norms and requirements. The training systematizes strategies, approaches, principles of

management, horizontal and vertical management, functions, competencies, and management activities of the director, as well as the necessary documents for the institution.

Course Aims and Objectives: To familiarize students with the management of educational institutions and develop competencies regarding knowledge, skills, and attitudes, as follows:

- Consolidating and enriching knowledge and skills for analyzing the results of the institution's activities, for developing, approving, and implementing programs, documents, and mechanisms for the institution's development, and for outlining measures to improve the quality and effectiveness of work.
- Comprehending the functions and competencies of the director to improve skills in planning, motivating, organizing, controlling, etc.
- Enhancing knowledge regarding human resource management and the quality of the educational institution.
- Systematizing knowledge and improving skills for applying the regulatory framework in the field of preschool and school education, state educational standards, and other subordinate legal documents.

Teaching Methods: The main form of organization and implementation of the educational process for this discipline are lectures. Lectures are in an interactive and consultative format for initial immersion into the subject matter of the discipline. During lectures, time is also allocated for solving problems/cases, discussing the process of document development, debating presented problems, and discussing materials prepared by students for extracurricular activities. The educational content is presented through presentations and the use of interactive methods such as: brainstorming, role-playing games, discussions, etc. For extracurricular activities, guidance is provided towards bibliography, internet resources, regulatory documents in electronic format, which can be used for solving independent tasks, developing presentations, creating partnership models, structuring internal institutional documents, etc.

Assessment: Current assessment at the end of the semester and a written exam.

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.

INCLUSIVE EDUCATION FOR CHILDREN AND STUDENTS WITH SPECIAL EDUCATIONAL NEEDS

Semester: 8th semester

Course Type: Lectures

Hours (per week): 2 hours lectures

Credits: 3.0 credits

Assessment: Exam

Department: Faculty of Pedagogy, SWU “Neofit Rilski” – Blagoevgrad

Course Status: Optional course in the B.S. Curriculum of “Pedagogy of Teaching of Mathematics, Informatics and Information Technology”.

Brief Description: The course "Inclusive Education for Children and Students with Special Educational Needs" involves the study of a number of important issues related to the inclusive

education of children with special educational needs. Significant attention is paid to the theoretical-content analysis of a number of key concepts. It examines the main forms of integrative and inclusive teaching and education for children with developmental anomalies; various models of such education that have proven effective in countries with established experience; the main prerequisites for creating a system for inclusive education; and the role and significance of special schools and support centers (CSOEDs) in the inclusive process.

Course Aims and Objectives: The aim of this discipline is to provide students with fundamental knowledge on issues related to the inclusion and social adaptation of children with special educational needs; to familiarize them with key international documents addressing these issues; with the regulatory basis of inclusive education in Bulgaria; and with the methodology of teaching in special and mainstream educational institutions for children with special educational needs.

Teaching Methods: Lectures; stimulating active debate in subgroups; planning and conducting mini-experiments for analyzing the behavior of children with special educational needs in different situations and different socio-cultural environments; business games, etc.

Assessment: Current assessment at the end of the semester and a written exam.

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.

COMMUNICATION SKILLS IN AN EDUCATIONAL ENVIRONMENT

Semester: 8th semester

Course Type: Lectures

Hours per Week: 2 hours of lectures

Credits: 3.0 ECTS

Assessment: Final Exam

Department: Faculty of Pedagogy, SWU "Neofit Rilski" – Blagoevgrad

Course Status: Optional course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Course Description (Annotation): This course clarifies and analyzes the communicative competence of the teacher as a key resource for implementing effective pedagogical interaction. The content focuses on specific elements of communicative behavior—such as **speech culture, verbal communication, and paralinguistic expression**—which optimize pedagogical communication in several directions:

1. Educational relationships as both a result and prerequisite for effective teacher-student interactions;
2. Mutual understanding, self-awareness, and influence in both verbal and non-verbal communication;
3. Inclusion, collaboration, and partnership with parents as active participants in the educational process.

Course Content:

- Communication and verbal interaction
- Types of communication systems

- Transformations of communication systems and conceptualization of human language paradigms
- Forms of verbal exchange in the process of verbalization
- Structure and organization of oral communication (monologic/dialogic)
- Categorical-semantic fields and individual communicative attributes
- Variability in non-verbal linguistic modality
- Theoretical and practical aspects of verbal communication
- Applied-constructive dimensions of human language use
- Communication and learning – the nature and characteristics of pedagogical communication
- Structural-interactional and descriptive approaches
- Core functions of pedagogical communication
- Physiological mechanisms of speech communication
- Dimensional, intentional, and functional analyses of verbal interaction
- Vocal-speech qualities of the teacher – professional standards
- Voice hygiene and voice-related professional disorders
- Paralinguistic tools in teaching – intonation, emphasis, and speech rhythm
- Orthoepeia and standardization of teacher's speech
- Normativity and naturalness in verbal expression
- Main functions of speech as a social phenomenon
- Forms of verbal influence (direct and indirect) in the educational environment
- Symbolic interactionism (G. H. Mead) and the theory of communicative action (J. Habermas)
- Stages of the verbal communication process
- Formal and informal verbal communication in education
- Pedagogical communication and verbal action – the teachings of K. S. Stanislavski
- Verbal action as a key imperative in the teacher's discourse ethics
- Objective barriers in pedagogical communication (functional or qualitative aspects)
- Communicative skills and pedagogical mediation – individual communicative style and positive psycho-emotional climate
- Presentation skills of the teacher
- Inspiration and improvisation in pedagogical oratory

Teaching Approach: The course includes both **in-class and out-of-class activities**:

- **In-class workload (30 hours):** Delivered through lectures involving case analysis, discussions, simulation games, brainstorming sessions, debates, and commentary on real-life communicative scenarios in kindergartens and schools.
- **Out-of-class workload (90 hours):** Students prepare and present speech-technical exercises, complete short communication tasks, analyze recorded verbal presentations (e.g., TED Talks), and write a paper (essay or report).

CIVIC EDUCATION

Semester: 8th semester
Course Type: Lectures
Hours (per week): 2 hours lectures
Credits: 3.0 credits
Assessment: Exam
Department: Faculty of Pedagogy, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Optional course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Brief Description: The course "Civic Education" provides students with the opportunity to acquire knowledge about the essence, principles, approaches, and methods for working with students in the field of civic education.
Course Aims and Objectives: The aim is to enable students to develop and expand their understanding of the links between education and citizenship; to stimulate their critical thinking and active participation; and to expand their competence in democratic culture.
Expected Learning Outcomes: Acquisition of skills for teaching and stimulating critical thinking; skills for building an active civic stance in students; skills for stimulating learning through action and gaining experience with an orientation towards demonstrating civic behavior.
Teaching Methods: Lectures; stimulating active debate in subgroups; content analysis of learning materials; business games, etc.
Assessment: The final grade takes into account the results of current assessment and the exam grade.
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.

II. Interdisciplinary and Applied-Experimental Courses, as well as Courses that Provide an Upgrade of Competences Related to the Specifics of the Professional Qualification

Group A. Mathematics

First Group

FUNDAMENTALS OF ARITHMETICS

Semester: 5 Semester
Course type: lectures + seminar exercises
Hours per week: 2 hours lectures + 1hour exercises
ECTS credits: 4.0 credits
Assessment: exam

Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Elective discipline in the curriculum of the specialty "Pedagogy of Teaching of Mathematics, Informatics and Information Technology"
Short Description: The main goal of a comprehensive high school algebra course is to construct the notion of number and the related operations and the relation of ordinance, 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 the purpose of the course. The basis of the course is theoretical. 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 of the notion of the natural number, of the operations of the addition and multiplication of two natural numbers and the laws which satisfy them, and of the inequality between the 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 ordinances, as extensions of the already established in the half-ring of natural numbers. The course ends with review of the real and complex numbers.
Course Objectives: Introducing the students to the modern theoretical ideas and presentation of the comprehensive high school algebra course.
Teaching Methods: Lectures, seminar exercises, consultations, coursework, and tests.
Requirements/Prerequisites: Basic knowledge of higher algebra and number theory is required.
Assessment: Continuous control during the semester, including homework and coursework, and a written exam on the content of the seminars and lectures.
Registration for the course: it is necessary to apply to the department at the end of the fourth Semester.
Registration for the exam: In agreement with the teacher and the department of student education.

FUNDAMENTALS OF GEOMETRY

Semester: 5 Semester
Course type: lectures + seminar exercises
Hours per week: 2 hours lectures + 1hour exercises
ECTS credits: 4.0 credits
Assessment: exam
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Elective discipline in the curriculum of the specialty "Pedagogy of Teaching of Mathematics, Informatics and Information Technology"
Short Description: Three of the axiomatics of Euclidean geometry are outlined: the axiomatics of D. Hilbert, the metric axiomatics of Kagan - Birchov-Kolmogorov, and the axiomatics of H. Weil, and their equivalence is proved. Particular attention is paid to the fact

that in metric axiomatics the concept of a real number is taken as the primary object which is why complete metric axiomatics contains in addition to the six geometric axioms and axioms for real numbers. This necessitates, in the proof that the axioms of Hilbert follow the axioms of metric axiomatics, to prove that the axioms of real numbers follow the axioms of Hilbert, 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 obtain a stable vocational training and to look at school geometry from a higher perspective.

Course Objectives: Students must acquire knowledge and skills for rigorously axiomatic construction of mathematical discipline.

Teaching Methods: Lectures, seminar exercises, consultations, coursework and tests.

Requirements/Prerequisites: Basic knowledge of analytical geometry and a school geometry course are required.

Assessment: Continuous control during the semester, including homework and coursework, and a written exam on the content of the seminars and lectures.

Registration for the course: it is necessary to apply to the department at the end of the sixth Semester.

Registration for the exam: In agreement with the teacher and the department of student education.

FUNDAMENTALS OF MATHEMATICAL MODELING

Semester: 5-th semester

Course Type: Lectures and tutorials

Hours per week /FS/SS: 2 lecture hours and 1 tutorial hour /FS

ECTS credits: 4,0 credits

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

Course Status: Elective discipline in the curriculum of the specialty “Pedagogy of Teaching of Mathematics, Informatics and Information Technology”

Short Description: The program contains the traditional material for the fundamentals of mathematical modeling. The course starts with the concept of model and what is the essence of modeling. A classification of mathematical models has been made and a large number of elementary models from different fields are considered - physics, chemistry, biology, medicine, economics and others.

Course Aims: The purpose of this course is to introduce students with the essence of mathematical modeling and some basic models from different fields of science.

Teaching Methods: lectures, tutorials, projects, and presentations.

Requirements/Prerequisites: The students should have basic knowledge in Differential and Integral Calculus.

Assessment: permanent control during the semester including one project and presentation, and exam in the semester’s end.

Registration for the exam: coordinated with the lecturer and student Service Department

MATHEMATICAL STRUCTURES

Semester: 5 Semester

Course type: lectures/ lab

Hours per week: 2 hours lectures + 1hour exercise

ECTS credits: 4.0 credits

Assessment: exam

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

Course Status: Elective discipline in the curriculum of the specialty "Pedagogy of Teaching of Mathematics, Informatics and Information Technology"

Short Description: The discipline of mathematical structures aims at students acquiring fundamental knowledge of basic mathematical structures – natural, integer, rational and real numbers, and their specific realization as basic algebraic systems. To build as a unified and harmonious system the preparation of students-future teachers in this most important mathematical question - mathematical structures and their teaching. To shape the world of future teachers in terms of the contemporary achievements of abstract mathematics.

Course content: In the course, mathematical structures present logically, consistently and fully, the theory of basic numerical systems taught in school - natural numbers, integers, rational numbers and real numbers. The theory of the field of complex numbers is presented in view of the completeness and completeness of the preparation of students. These numerical systems are constructed using the terminology and basic results of modern mathematics. This makes it possible not only to construct numerical systems constructively but also to interpret them meaningfully as semigroups, groups, semigroups, rings, and fields. The theory of real numbers is constructed as Dedekind sections, as a cantorial complement to the ordered field of rational numbers, as decimal and systematic fractions, and finally as chain fractions. Basic algebraic systems are presented not only in terms of principal operations but also in terms of their principal relations, in particular linear and complete ordinances, as well as the basic laws relating to principal operations and principal relations. Some basic information about the theory of numbers are presented, such as division by private and residual, largest common divisor and least Total multiple, and Euclid's algorithm.

Teaching Methods and Assessment: The training consists of a lecture course, seminars and the organization and control of students' extracurricular activities. During the lecture course students are taught the theoretical material in this discipline, during the seminars students solve problems on the relevant topics, and during the self study they learn the material independently, prepare control works and homework. Assessment consists of ongoing control and homework assessments and a written assignment and development of theoretical questions. There are procedures and rules for exams, exemptions during the written exam. A point system is in place that objectively evaluates each component of student activity.

Registration for the course: it is necessary to apply to the department at the end of the fourth Semester.

Registration for the exam: in agreement with the teacher and the department of student education.

Second Group

PRACTICAL COURSE IN MATHEMATICAL MODELLING IN MATLAB

Semester: 6 Semester
Course type: lectures + labs
Hours per week: 1hour lecture + 2 hours lab
ECTS credits: 4,5 credits
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Elective discipline in the curriculum of the specialty "Pedagogy of Teaching of Mathematics, Informatics and Information Technology"
Short Description: The course is included as an elective in the curriculum and is intended for students with a keen interest in mathematical modeling and the numerical implementation of mathematical models through software products, in particular – the Matlab software environment. It introduces students to the rich capabilities of Matlab, which is a solid base for performing analytical and numerical calculations in a number of fields, as well as creating their own software packages.
Course Objectives: The course discusses the basic functions of the Matlab kernel and how to create new programs (m-files). Particular attention is paid to programming and creating custom programs to solve mathematical models. The purpose of the laboratory exercises is to acquaint the students with the graphical environment for simulation of Simulink systems and the rich possibilities of Matlab for calculating boundaries, derivatives, integrals, study of functions and actions with complex numbers or most Total in the application of the environment in mathematical modeling.
Teaching Methods: Lectures, labs, consultations, tests.
Requirements/Prerequisites: Basic knowledge of the school's course in mathematics and subjects, such as "Linear Algebra", "Analytical Geometry", and "Mathematical Analysis" is required. If a programming language is known, it is also an advantage.
Assessment: Continuous control during the semester, including two tests, and a written exam on laboratory exercises and lecture material.
Registration for the course: it is necessary to apply to the department at the end of the previous semester.
Registration for the exam: In agreement with the teacher and the department of student education

POLYNOMIALS OF ONE OE MORE VARIABLES

Semester: 6-th semester
Course Type: Lectures and tutorials
Hours per week /FS/SS: 2 lecture hours and 1 tutorial hour / SS
ECTS credits: 4,5 credits
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad

Course Status: Elective course in the Bachelor's curriculum of "Pedagogy of Teaching Mathematics, Informatics and Information Technologies"

Short Description: The optional course "Polynomials of one or more variables" deepens and expands the students' knowledge acquired from the course in Algebra and Number Theory. The course begins with an overview of basic concepts, such as polynomials of one variable, actions with polynomials, zeros of polynomials, decomposition of polynomials. The algebraic closedness of the field of complex numbers is proved and some basic corollaries of D'Alembert's theorem are considered. The decomposition of polynomials with real and complex coefficients is studied. Students get acquainted with Cardano's formulas for solving equations of third and fourth degree. Definitions and examples of cyclotomic (circular) polynomials and matrix polynomials are given. In the section for polynomials of more variables, the basic concepts and statements related to symmetric polynomials are first recalled, then the power sums are introduced and Newton's formulas for the relationship between power sums and elementary symmetric polynomials are given. The concepts of discriminant and resultant of polynomials are considered. Attention is paid to the solution of nonlinear algebraic systems of equations with the help of the resultant.

Course Aims: The aim of this course is for students to gain more in-depth knowledge and skills about the polynomials of one or more variables, as well as the applications of this apparatus for the algebraic solvability of some special types of equations.

Teaching Methods: lectures, tutorials, homework, and problem-solving tests.

Requirements/Prerequisites: The students should have basic knowledge in Linear and Abstract algebra.

Assessment: permanent control during the semester including homework and written exams, and written exam in the semester's end on topics from tutorials and on topics from lectures.

Registration for the exam: coordinated with the lecturer and student Service Department

NUMERICAL METHODS MONTE CARLO

Semester: 6 Semester

Course type: lectures

Hours per week: 2 hours lectures / 1hour exercise

ECTS credits: 4.5 credits

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

Course Status: Elective discipline in the curriculum of the specialty "Pedagogy of Teaching of Mathematics, Informatics and Information Technology"

Short Description: The course includes the study of elements of probability theory as the basis of Monte Carlo methods of financial mathematics. The basic components of this discipline are also studied – the Brownian movement, the technique of variation reduction, stochastic methods of these problems, and applications for the study of American Options.

Course Objectives: To learn the basic concepts and methods for stochastic study of random variables.

Teaching Methods: Lectures, exercises, consultations, homework, coursework, ongoing tests.

Requirements/Prerequisites: good knowledge of mathematical analysis, probability theory, differential equations and other fields.
Assessment: Written exam on the lecture material.
Registration for the course: it is necessary to apply to the department at the end of the previous semester.
Registration for the exam: In agreement with the teacher and the department of student education.

DISCRETE MATHEMATICS

Semester: 6 Semester
Course type: lectures, exercises
Hours per week: 2 hours lectures and 1 hour exercise
ECTS credits: 4 credits
Assessment: exam
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Elective discipline in the curriculum of the specialty "Pedagogy of Teaching of Mathematics, Informatics and Information Technology"
Short Description: Basic sections of:

- combinatorics;
- graph theory;
- theory of discrete functions;
- finite state machines and formal languages.

In terms of structure and content, the course coincides with similar courses at several reputable universities around the world.
Discrete structures and their properties are closely related to the issues of the design and operation of modern computers. For this reason, the whole course emphasizes the methods of applying discrete mathematics in computer science.
Course Objectives: The course aims to provide students with knowledge of the basic sections of discrete structures that are very widely used in modern computers.
Teaching Methods: Extensive theoretical material is given in four lecture hours. From a methodological point of view, it is preferable that the lectures take place at the beginning of the week (Monday and Tuesday). In the exercises, students are prepared to solve specific practical problems related to theory. The lecture course is provided for free reading by the students on the departmental web site www.cs.swu.bg/courses/online.htm. The classes are held in seminar rooms and in the computer labs.
Requirements/Prerequisites: Basic knowledge of algebra course and graph theory is required.
Assessment: written exam.
Students are required to successfully complete two tests during the semester. The two grades from the tests make up 40% of the final semester grade. After the end of the semester, a written examination and interview are conducted, after which the final assessment.

Registration for the course: it is necessary to apply to the department at the end of втория Semester

Registration for the exam: in agreement with the teacher and the department of student education.

Third group

SYMMETRIC SEMIGROUPS

Semester: 7-th semester

Course Type: Lectures

Hours per week /FS/SS: 3 lecture hours /FS

ECTS credits: 4,5 credits

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

Course Status: Optional course in the B.S. Curriculum of „Pedagogy of teaching Mathematics, Informatics and IT".

Short Description: Symmetric semigroups (transformation semigroups) belong to the most fundamental objects in Mathematics. They arise naturally as endomorphism semigroups of various mathematical structures. They also occur in theoretical computer science, where properties of languages depend on algebraic properties of various transformation semigroups related to them. Transformation semigroups are of essential importance for the structure theory of finite state machines or automata. They also occur in the theory of digital networks by viewing a state machine as a network composition of coupled smaller state machines, of which there are five basic types (since there are five non-isomorphic semigroups of order 2). Of course, transformation semigroups are also of great importance for semigroup theory, as every semigroup is isomorphic to a transformation semigroup. The course begins with the study of basic concepts, properties and examples of the theory of semigroups. Particular attention is paid to the Green's relations for symmetric semigroups. Some special elements like idempotents, regular and inverse elements, as well as generating sets and rank of semigroups are considered. The course continued with the study of a number of symmetric semigroups with specific properties such as semigroups of order-preserving or order-reversing transformations, semigroups of orientation-preserving or orientation-reversing transformations, partial symmetric semigroups, symmetric inverse semigroups.

Course Aims: The purpose of this course is to introduce students to the basic theory of the symmetric semigroups and its applications to the other mathematical disciplines. The content of the course gives the students the opportunity to be able: to study alone and in more details the theory of the symmetric semigroups; to follow other courses that use semigroup theory; to attend specialized scientific seminars in algebra; to reading articles and books in this field.

Teaching Methods: lectures, projects, and presentations.

Requirements/Prerequisites: The students should have basic knowledge in Abstract algebra.

Assessment: permanent control during the semester including one project and presentation, and exam in the semester's end.

Registration for the exam: coordinated with the lecturer and student Service Department

NUMERICAL METHODS FOR EXTREMUM PROBLEMS

Semester: 7th semester
Course type: lectures, exercises
Hours per week: 2 hours lectures, 1hour exercise
ECTS credits: 4.5 credits
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Elective discipline in the curriculum of the specialty "Pedagogy of Teaching of Mathematics, Informatics and Information Technology"
Course Objectives: Purpose and the main objective of the course Numerical Methods for Extremum Problems is to provide students with knowledge of the basic numerical methods for solving different classes of optimization (extreme) problems.
The topics of algorithm, algorithmic image, composite image and convergence of algorithmic images is considered. The basic methods for one-dimensional minimization are presented: the splitting method, the gold section method, the Fibonacci method, the Newton method, the parabola method. The basic unconditional optimization methods are also envisaged: zero-order methods (coordinate descent method, Hook and Jeeves method, Rosenbrock method), first-order (gradient methods: fastest descent method), second-order (Newton method, method modifications) as well as conjugate methods (conjugate gradient method: Fletcher-Reeves method, Pollock-Ribier method; quasi Newtonian methods: Davidson-Fletcher - Powell method). Methods of conditional optimization are considered – methods of possible directions (of Zoitendijk, of Rosen, of the reduced gradient), methods of penal (fining) and barrier functions. Particular attention is paid to the basics of non-smooth analysis and methods of non-differentiable (non-smooth) optimization. The study of basic results and methods of stochastic optimization is envisaged. Numerical methods are presented for solving separable optimization problems. The basics of the dynamic optimization method and the R. Belman principle are studied. Vector (multicriteria) optimization and Pareto optimization are considered.
Registration for the course: it is necessary to apply to the department at the end of the previous semester.
Registration for the exam: In agreement with the teacher and the department of student education.

HISTORY OF MATHEMATICS

Semester: 7th semester
Course type: lectures
Hours per week: 3 hours lectures
ECTS credits: 4.5 credits
Assessment: exam
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad

Course Status: Elective discipline in the curriculum of the specialty "Pedagogy of Teaching of Mathematics, Informatics and Information Technology"
Short Description: The course includes the main stages of the development of mathematical knowledge until the end of the 19th century
Course Objectives: To acquaint the 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.
Requirements/Prerequisites: Knowledge of the school mathematics course.
Assessment: Written exam on the theory
Registration for the course: it is necessary to apply to the department at the end of the previous semester.
Registration for the exam: In agreement with the teacher and the department of student education.

MATHEMATICAL MODELS IN ECONOMICS

Semester: 7th semester
Course Type: Lectures /L/ + Tutorials /T/
Hours per Week: 2 hours of lectures + 1 hour of tutorials
Credits: 4.5 ECTS
Assessment: Final written exam
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Elective course within the curriculum of the Bachelor's program in "Pedagogy of Teaching in Mathematics, Informatics, and Information Technologies"
Course Description: This course on *mathematical models in economics* explores models frequently used in both macroeconomics and microeconomics. The set of mathematical models that accurately describe economic processes to varying degrees is collectively known as **mathematical economics**.
The course includes models of:

- **Production activity** (so-called real economy),
- **Financial and credit activity**,
- **Price formation** and **taxation modeling**.

From a mathematical perspective, the course also examines issues related to **economic forecasting** and **regulation**.
Course Aim: The course provides mathematics students with knowledge of mathematical models used in economic phenomena. It offers the opportunity to study how these models and methods can be applied in real-world practice.
Teaching Methods: Lectures and seminars/tutorial sessions.
Assessment: Final assessment is based on a **written exam**.
Exam Registration: Students schedule their exam dates in coordination with the lecturer and the university's academic office.

SPECIFIC STEM EDUCATIONAL TECHNOLOGIES IN MATHEMATICS EDUCATION

Semester: 7th semester
Course Type: Lectures /L/ + Tutorials /T/
Hours per week: 1 hour of lectures + 2 hours of tutorials
Credits: 4.5 ECTS
Assessment: Final exam
Department: Department of Mathematics and Physics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Elective course within the curriculum of the Bachelor's degree program "Pedagogy of Teaching in Mathematics, Informatics and Information Technologies"

Course Description:

The inquiry-based approach in STEM education plays a crucial role as a link between the natural sciences and their real-world applications. Therefore, mathematics and the concept of mathematical modeling should be viewed as essential elements across all STEM fields. Accordingly, the methodologies for teaching mathematics should align with the STEM approach. These methodologies challenge students to explore and model mathematical concepts, build their own understanding, and discover connections between different school subjects and their applications to real-life situations.

For this reason, the development of mathematical competencies from an early age is a key factor for future professional success and adaptability in the labor market.

Course Aim: The aim of this course is for students to acquire practical experience in a STEM-oriented environment, enabling them to integrate innovative technologies and software solutions in the teaching of mathematics at school. This experience will encourage creativity in teaching and help students prepare their future pupils for success in various areas of life by developing logical thinking, problem-solving abilities, digital literacy, and emotional intelligence.

Teaching Methods: Lectures, laboratory tutorials, consultations, and tests.

Assessment: Ongoing assessment (C) is carried out during the semester based on participation in lectures and tutorials. The final grade combines results from the continuous assessment and the final exam.

Exam Registration: Students schedule their exam dates in consultation with the lecturer, within the framework of the official academic exam calendar.

Group B: Informatics and IT

First Group

ALGORITHMS AND PROBLEMS IN EXTRACURRICULAR ACTIVITIES IN INFORMATICS AND IT

Semester: 5th semester
Course Type: Lectures /L/ + Laboratory Exercises /LE/

Hours per Week: 2 hours of lectures + 1 hour of laboratory exercises
Credits: 4.0 ECTS
Assessment: Final exam
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Elective course in the curriculum of the Bachelor's degree program "Pedagogy of Teaching in Mathematics, Informatics, and Information Technologies"
Course Description: In recent decades, **graph theory** has attracted particular interest from both mathematicians and computer scientists. It has emerged as a broad branch of discrete mathematics with many intriguing theorems and practical applications.
This course does not focus on the formal theoretical aspects of graph theory. Instead, it emphasizes the **development of C++ programs** that utilize graphs to solve problems.
Key topics covered include:

- Basic concepts and definitions in graph theory
- Modeling with graphs and relationships
- Computer-based representations of relations and graphs
- Vertex and edge matchings (problem formulation and examples, maximum size and weight)
- Eulerian cycles
- Hamiltonian cycles

Extracurricular work for the course includes computer-based exercises and online research. The **ratio of in-class to out-of-class workload** is approximately 1:2.
Course Aim: Students are expected to apply fundamental knowledge of **graph theory** and **C++ programming** to develop problem-solving skills related to real-world challenges modeled through graphs and networks.
Teaching Methods: Lectures, laboratory exercises, consultations, and in-class assessments.
Assessment: Continuous assessment (C) is conducted throughout the semester. The **final grade (FG)** is calculated using the formula: **FG = (C + E) / 2**, where **E** is the final exam grade.
Exam Registration: Students schedule exam dates in coordination with the course instructor, within the official exam calendar.

INTERNET TECHNOLOGIES

Semester:4 semester
Type of Course: lectures and tutorials in computer lab.
Hours per week – 2 hours lectures and 1 hour tutorials in computer lab/ spring semester.
Credits Numbers: 4 credits
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Optional course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Course description: The course is introduction in design of Web-based Internet/Intranet information systems based on Oracle Application Express technology.

Objectives: The student should obtain knowledge of:

- Design of Internet/Intranet Web-based information systems.
- Practical aspects of Internet/Intranet Web-based information systems development.

Methods of teaching: lectures, tutorials, discussions, project based method.
Pre- requirements: Database systems (core course), Internet Programming (core course)
Assessment and Evaluation
Project- 60%
Final Test- 40%
The course is successful completed with at least 51% of all scores.
Registration for the Course: not required (core course)
Registration for the Exam: coordinated with the lecturer and the Student Service Office

JAVAS SCRIPT PROGRAMMING

Semester: 5 semester
Credits Numbers: 4,0 credits
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" – Blagoevgrad
Course Status: Optional course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".
Course description: The course is an introduction to the design and development of JavaScript applications and interfaces of Web-based information systems.
Objectives: The student should obtain knowledge of:

1. Design and implementation of JavaScript applications.
2. Design and implementation JavaScript client interfaces of Web-based information systems.

Methods of teaching: lectures, tutorials, discussions, project-based method.
Pre-requirements: "Introduction to Computer Programming" (core course).
Assessment and Evaluation

1. Project- 60%
2. Final Test- 40%

The course is successfully completed with at least 51% of all scores.
Registration for the Course: by request at the end of the current semester
Registration for the Exam: coordinated with the lecturer and the Student Service Office

TECHNOLOGY AND DATA PROCESSING FROM PEDAGOGICAL EXPERIMENTS

Semester: 5th semester
Course Type: Lectures (L), Laboratory Exercises (LE)
Hours (per week): 2 hours L + 1 hour LE
Credits: 4.0 ECTS
Assessment: Exam
Department: Department of Informatics, Faculty of Natural Sciences and Mathematics, South-West University "Neofit Rilski" – Blagoevgrad

Course Status in the Curriculum: Elective course in the curriculum of the program Pedagogy of Teaching Mathematics, Informatics, and Information Technology

Course Description: The course aims to develop skills for designing, evaluating, and analyzing didactic tests, as well as for the statistical analysis of data obtained from student achievement assessments. It introduces the theoretical foundations and fundamental methods for evaluating learning outcomes. An introduction is provided to classical test theory used for measuring educational achievement. The course examines key issues in test design, such as validity, reliability, standardization, and more.

It also includes training in modern specialized software tools for statistical data processing, including the *Data Analysis* add-in in MS Excel. This enables students to apply modern technologies for statistical processing and analysis of student assessment data.

Course Objectives: The course has the following main objectives:

- To illustrate the basic principles, stages, and tools for conducting pedagogical research in various subject areas and educational contexts.
- To present the use of indicators for assessing the psychometric qualities of tests.
- To introduce the main types of student assessment data and the appropriate statistical procedures for their analysis.
- To teach basic statistical procedures included in the Data Analysis add-in.
- To enhance the competencies of educational professionals in applying modern tools for statistical processing and analysis of learning outcomes.

Teaching Methods: Lectures, demonstrations, project work, and teamwork.

Requirements: Basic knowledge of probability and statistics is required.

Assessment: Ongoing assessment is conducted during laboratory sessions through the completion of individual assignments (U9, ..., U13) and the defense of a course project (CP). The grade from the project and the average from the assignments are weighted equally.

The ongoing assessment grade (OA) is calculated using the formula:

$$OA = 0.5 \times CP + 0.5 \times (U9 + U10 + ... + U13) / 5$$

Students who do not achieve a minimum average grade of “Satisfactory” (3.00) in the ongoing assessment are not allowed to take the exam during the regular exam session. They must submit additional assignments and, upon receiving at least a grade of 3.00, are then eligible to take the written exam in a retake or makeup session.

The ongoing assessment contributes 60% of the final grade, provided that the OA is at least 3.00.

The Final Grade (FG) is calculated as follows:

$$FG = 0.60 \times OA + 0.40 \times \text{Final Test (FT)}$$

Registration for the Course: Enrollment is done through the academic department at the end of the current semester.

Registration for the Exam: Coordinated with the course lecturer and the Student Services Department.

Second group

GRAPHIC DESIGN OF PRINTED AND PROMOTIONAL MATERIALS

Semester: 6th semester
Course Type: lectures and lab exercises
Hours per week/SS: 2 lecture hours per week and 1 lab hour per week / SS
ECTS credits: 4.5 credits
Department: Department: Department of Informatics, Faculty of Natural Sciences and Mathematics, South-West University "Neofit Rilski" – Blagoevgrad
Course Status: Optional Course in Bachelor of Science Curriculum of Mathematics
Course Description: The course is a practical introduction to desktop publishing systems. Students learn the best practices in the development of print and electronic materials, such as brochures, leaflets, posters, magazines, newspapers and more. Studied are the principles of working with the software used in publishing. Discussed are typical problems in the field of publishing and advertising activities. The course prepares students for the future development of different types of designs of promotional materials, web sites and more.
Course Objectives This course aims to provide students with knowledge and additional training in the theory and practice of publishing systems. They will learn about the methods of digital image processing, how to create vector graphics and prepress of promotional materials with different purpose.
Teaching Methods: Lectures, demonstrations, work on project and teamwork.
Requirements: Needed basic knowledge of operating systems, information technology, graphics editors and working with multimedia files.
Assessment: The assessment of students is carried out according to the six-point system - 2, 3, 4, 5, 6. Current control includes attendance at lectures and exercises, participation in discussions, preparation of presentations, solving tasks, tests, control, and coursework. Students who do not have a minimum average score of 3.00 from the current control are not allowed to take the exam in the regular session. They should submit additional projects and after receiving a score of at least an average of 3.00 are allowed to take a written exam in a remedial or liquidation session. The score from the current control is weighted 75% of the semester grade if it is at least 3.00. The exam grade is weighted 25% of the semester grade if it is at least 3.00.
Registration for the Course: Applied to the academic department at the end of current semester.
Registration for the Exam: Coordinated with the lecturer and Student Service Department.

PYTHON PROGRAMMING

Semester: 6th semester
Course Type: Lectures and Laboratory Exercises
Hours per Week: 2 hours of lectures + 1 hour of lab sessions
Credits: 4.5 ECTS

Department: Department of Informatics, Faculty of Natural Sciences and Mathematics, South-West University "Neofit Rilski" – Blagoevgrad

Course Status: Optional course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Course Description: The course "Python Programming" introduces students to problem-solving techniques and programming approaches using the Python programming language.

It covers fundamental aspects such as:

- Numeric and character data types
- Operators and expressions
- Control structures
- Functions and methods
- Objects and classes

The course also explores Object-Oriented Programming (OOP) principles in Python, including:

- Class abstraction and encapsulation
- Inheritance and polymorphism
- Exception handling

Students will work with various data structures such as:

- Lists, tuples, sets, and dictionaries

The course covers:

- File manipulation techniques
- Data formatting and encoding
- Regular expressions

Demonstration programs are used throughout to illustrate Python's syntax and semantics in practical scenarios.

Course Aim: The main goal of the course is to enable students to acquire knowledge and skills for effectively solving programming problems using Python. Each student is expected to develop practical experience in implementing basic programming techniques using the Python language.

Teaching Methods: Lectures, discussions, hands-on exercises, and project-based learning.

Assessment:

- **Continuous Assessment** – 50% of the final grade
- **Practical Exam** – 50% of the final grade

To pass the course, students must achieve at least **51%** of the total score.

If a student achieves a **continuous assessment grade above 5.50 (out of 6.00)**, they may be exempt from the final practical exam.

Course Registration: Students apply to the Head of the Department of Informatics.

Exam Registration: Exam dates are coordinated with the lecturer and the Academic Office.

WEB DESIGN

Semester: 6th semester

Course Type: lectures and lab exercises

Hours per week/SS: 2 lectures and 1 lab hours per week / SS

ECTS credits: 4.5 credits

Department: Department of Informatics, Faculty of Natural Sciences and Mathematics, South-West University "Neofit Rilski" – Blagoevgrad

Course Status: Optional course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Course Description: The course examines issues and techniques related to the content organization and visualization on the web. Techniques for the static and dynamic pages developing and integrating them into complete websites are presented. An introduction to HTML, XHTML, and CSS is also provided. During the laboratory sessions, a website will be developed using the languages and technologies as HTML, CSS, JavaScript, C# and ASP.Net MVC. This course will allow the students to develop and refine the skills to design website designs and concepts. They can study how to use the appropriate fonts on the web and how to create and process vector and raster images suitable for web content.

Course Objectives: This course aims to provide depth theoretical knowledge and practical abilities in the field of adaptive web design. They will study the developing methods of websites, layout, and composition of the web elements, depending on the type of device and websites publishing.

Teaching Methods: Lectures, demonstrations, work on project and teamwork.

Requirements: Needed basic knowledge of operating systems, information technology, graphics editors and working with multimedia files.

Assessment: Evaluating the student shall be carried out in the sixth grad scale – 2, 3, 4, 5, 6. Evaluation of current control is obtained by taking the average of the assessment of coursework and tasks solved during the semester. Students who have a minimum average estimate /3/ of the current control is not allowed to test the regular session. They must present additional development and evaluation after receiving at least medium /3/ be admitted to the written examination of supplementary or liquidation session. The final estimate is 60% of the current control and 40% of the written exam.

Registration for the Course: Submitted an application to the academic department at the end of current semester.

Registration for the Exam: Coordinated with the lecturer and Student Service Department.

WEB CONTENT MANAGEMENT

Semester: 6th semester

Course Type: lectures and labs

Hours (weekly)/WS/SS: 2 lecture and 1 lab per week / SS

ECTS Credits: 4.5 credits

Department: Department of Informatics, Faculty of Natural Sciences and Mathematics, South-West University "Neofit Rilski" – Blagoevgrad

Course Status: Optional course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Short Description: Modern ways creation of web content - blogs, wikis, social media require organized content management. The integration of websites with social media features and building shared content through various web services are important elements of the

management of any modern website. This course covers topics related to the core technology stack in the global network, creating content strategies, content distribution strategies, analyzing and optimizing content for search engines. Topics related to marketing, branding and improving the customer experience are also partially addressed. The course examines various web technologies as well as specific content management systems (SMS) - file-based, blogging, full platforms, wikis, such as GravCMS, WordPress, BoltCMS, MediaWiki, Umbraco and others.

Course Aims: To familiarize students with various activities tasks in content management and website building.

Teaching Methods: Lectures, Labs, Discussions, Project Based Methods

Requirements/Prerequisites: Completed courses on Programming, Operating Systems, Networks and Systems Administration.

Exam: final exam

Enrollment for training in the discipline: according to the rules for educational activities

Registration for the exam: Coordinated with lecturer and Students Service Department

EDUCATIONAL COMPUTER GAMES IN MATHEMATICS AND INFORMATICS

Semester: 7 Semester

Course type: lectures, exercises

Hours per week: 2 hours lectures, 1hour exercises

ECTS credits: 4.0 credits

Assessment: exam

Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad

ourse Status: Elective discipline in the curriculum of the specialty "Pedagogy of Teaching of Mathematics, Informatics and Information Technology"

Short Description: The course "Educational Computer Games in Mathematics and Informatics" is part of the curriculum and includes 8 summarized topics. Current controls and exam are provided as a form of control.

The content of the program covers the main issues related to theoretical, methodological and technical preparation for the creation and use of educational computer games in mathematics and informatics.

Those who successfully passed the Educational Computer Games in Mathematics and Informatics' exam will acquire the necessary minimum of knowledge both to create prototypes of elementary educational games and to find ways to implement them in the learning process.

In practical exercises, students are trained in scenario development and educational games. Finding the place and role of computer games in the mathematics and informatics learning process.

Course Objectives: The purpose of the course "Educational Computer Games in Mathematics and Informatics" is to develop knowledge and skills to create scenarios and prototype educational computer games and apply them in the learning process

Expected results:

Upon completion of the course, students should be able:

- to create educational computer game scenarios for elementary school students;
- to create prototypes of elementary educational games with various technological means;
- to plan lesson activities;
- to implement educational computer games in the learning process.

Registration for the course: it is necessary to apply to the department at the end of the previous semester.

Registration for the exam: In agreement with the teacher and the department of student education.

Third group

INTERACTIVE MULTIMEDIA TECHNOLOGIES

Semester: 7 Semester
Course type: lectures, exercises
Hours per week: 2 hours lectures, 1hour exercise
ECTS credits: 4.0 credits
Assessment: exam
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad
Course Status: Elective discipline in the curriculum of the specialty "Pedagogy of Teaching of Mathematics, Informatics and Information Technology"
Short Description: The course in Interactive Multimedia Technologies is intended for students in the fields of Informatics and Mathematics and Computer Science at the Faculty of Mathematics and Mathematics.
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 trends in the development 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.
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;
- Apply basic principles and technologies for designing and creating interactive multimedia content.

Registration for the course: it is necessary to apply to the department at the end of the previous semester.

Registration for the exam: In agreement with the teacher and the department of student education.

THEORETICAL FOUNDATIONS OF INFORMATICS

Semester: 7 semester

Course type: lectures and seminars

Hours (weekly) / FS / SS: lectures: 2 hours per week and seminars: 1 hour per week / FS

Number of ECTS credits: 4.5

Department: Department of Informatics, Faculty of Natural Sciences and Mathematics, South-West University "Neofit Rilski" – Blagoevgrad

Course Status: Optional course in the B.S. Curriculum of "Pedagogy of Teaching of Mathematics, Informatics and Information Technology".

Course description: It deals with the theory of algorithms.

Goal: The course in Theoretical foundations of informatics aims to introduce students to the basic concepts and results of the theory of algorithms.

Teaching methods: lectures, demonstrations, problem solving

Prerequisites: The acquired knowledge is useful in theory of algorithms.

Examination and assessment procedures:

The estimation of the acquired knowledge is based on a written exam which consists of problem solving and theoretical knowledge examination (writing on a topic from the syllabus provided to students)

The final grade includes the assessment of the students' progress throughout a course of study (70 %) plus the examination at the end of it (30 %).

Course enrolment: Students should submit an application at the academic affairs department at the end of the current semester

Registration for examination: coordinated with the lecturer and the academic affairs department

TECHNOLOGIES FOR THE DEVELOPMENT AND ANALYSIS OF DIDACTIC TESTS

Semester: 7th semester

Course type: Lectures and practical sessions

Hours per week: 2 hours of lectures + 1 hour of practicals

ECTS credits: 4.5 ECTS

Assessment: Continuous assessment and final exam (60% coursework + 40% final test)

Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, SWU "Neofit Rilski" - Blagoevgrad

Course Status: Elective discipline in the curriculum of the specialty "Pedagogy of Teaching of Mathematics, Informatics and Information Technology"

Short Description: The course equips students with skills to design, assess, and analyze didactic tests. It introduces classical test theory and key statistical concepts using modern tools such as MS Excel with Data Analysis extension. Students create their own tests and perform real data analysis on student achievement

Courses Objectives and Expected results :

- Develop competencies for educational assessment
- Acquire basic statistical analysis procedures
- Use digital tools like Excel for educational data analysis
- Prepare and defend a course project based on real assessment data

Registration for the course: it is necessary to apply to the department at the end of the previous semester.

Registration for the exam: coordinated with the lecturer and the academic affairs department

SPECIFIC STEM EDUCATIONAL TECHNOLOGIES IN INFORMATICS EDUCATION

Semester: 7th semester

Course Type: Lectures /L/, Laboratory Exercises /LE/

Hours (weekly): 1 hour L + 2 hours LE

Credits: 4.5 credits

Assessment: Exam

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

Status of the Discipline in the Curriculum: Elective course in the curriculum of the specialty “Pedagogy of Teaching in Mathematics, Informatics and Information Technologies”

Course Description: The research-based approach in STEM education is extremely important as a bridge between technologies and their real-life application. In this course, informatics and the idea of modeling are considered essential elements across all STEM fields, and the teaching methodologies for informatics and IT are aligned with the STEM approach.

Course Objective: The aim of the course is to enable students to gain practical experience in a STEM environment, which will allow them to implement innovative technologies and software solutions in the field of informatics and IT when teaching school subjects. This will help them demonstrate creativity in teaching and prepare students for successful future careers in various spheres of life by developing their logical thinking, problem-solving skills, digital literacy, and emotional intelligence.

T**eaching Methods:** Lectures, laboratory exercises, consultations, written tests.

Assessment: The main method for checking and evaluating students' knowledge is a written exam. Students' knowledge and skills are assessed using a six-point grading system: Excellent (6), Very Good (5), Good (4), Satisfactory (3), Poor (2).
The final grade is determined provided that the student has received at least a grade of Satisfactory (3.00) in the continuous assessment, and is calculated as follows: 60% from continuous assessment and 40% from the final exam.

Enrollment in the Course: Application submitted to the Head of the Department of Informatics

Enrollment for the Exam: In coordination with the lecturer and the Academic Affairs Office.