QUALIFICATION CHARACTERIZATION
OF MAJOR FIELD OF STUDY “MATHEMATICS AND INFORMATICS”
FOR “BACHELOR OF SCIENCE” DEGREE
WITH PROFESSIONAL QUALIFICATION “TEACHER IN MATHEMATICS,
INFORMATICS AND ICT”

I. Requirements to professional qualities and competences of students, completed this major field of study
South-West University “Neofit Rilski” prepares qualified experts in Mathematics and Informatics that can apply their knowledge and skills in the area of science, culture, education and economics in Bulgaria and abroad. After completion of Bachelor of Science (BSc) degree in Mathematics and Informatics, they can successfully realize themselves as teachers in Mathematics, teachers in Informatics and teachers in ICT.
At completion of Bachelor of Science degree in Mathematics and Informatics, students obtain:

- profound knowledge in the area of Mathematics and Informatics;
- good knowledge of the latest technologies for multimedia education, the development of modern educational technologies, trends and strategies for education;
- good preparation in the area of Mathematics and Informatics as well as solid practical skills conforming to modern European standards and requirements;
- good opportunities for realizing as teachers in Mathematics, Informatics and ICT;
- opportunity for successful continuation of education in higher degrees (Master of Science and PhD) in Bulgaria and abroad.

II. Requirements to preparation of students completing this major field of study
Students completed BSc degree in Mathematics and Informatics have to possess following knowledge, skills and competences:

- to use the obtained knowledge in the practice;
- to use and apply competently the latest multimedia technologies;
- to use and apply competently fundamental knowledge in the area of Mathematics and Informatics;
- to posses and apply modern educational technologies.

Qualification characterization of Major field of study “Mathematics and Informatics” for BSc degree is a basic document that determines rules for developing the curriculum. This qualification characterization is conformed to legislation in the area of higher education in Republic of Bulgaria.
# CURRICULUM

**Field of Study:** Mathematics and Informatics, 2008, Updated 2012

## First Year

<table>
<thead>
<tr>
<th>First Semester</th>
<th>ECTS credits</th>
<th>Second Semester</th>
<th>ECTS credits</th>
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<tbody>
<tr>
<td><strong>Compulsory Courses</strong></td>
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<td><strong>Compulsory Courses</strong></td>
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<tr>
<td>Linear algebra</td>
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<td>Analytical geometry</td>
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<td>Mathematical analysis II</td>
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<td>Mathematical analysis I</td>
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<td>Algebra</td>
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<td>Introduction to programming</td>
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<td>Object-oriented programming</td>
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<tr>
<td>Sport</td>
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<td>Graph theory</td>
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## Second Year

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<td><strong>Compulsory Courses</strong></td>
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<td>Differential equations and applications</td>
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<td>School course of geometry</td>
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<td>Operating systems</td>
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<td>School course of algebra and analysis</td>
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<td>Optional course 1</td>
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<td>Optional course 2</td>
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<tr>
<td>Computer architectures</td>
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<td>Computer models in natural sciences</td>
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<tr>
<td>Discrete mathematics</td>
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<td>Algorithms for graphs and networks</td>
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<td>Information technology</td>
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<td>Numerical analysis</td>
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<td>School courses of informatics and ICT</td>
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<td>Pre-graduation pedagogical practice in informatics</td>
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<td>Applied statistic</td>
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TOTAL FOR 4 ACADEMIC YEARS: 240 CREDITS
LINEAR ALGEBRA

Semester: 1 semester
Course Type: Lectures and tutorials
Hours per week: 3 lecture hours and 2 tutorial hours / Fall Semester
ECTS credits: 7.5 credits
Lecturer: Assist. Prof. Dr. Ilinka Dimitrova
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: ilinka_dimitrova@swu.bg
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.
Short Description: The education of that discipline includes some of the basic notations in combinatory and complex numbers. Students study matrices, determinants, systems linear equations and methods for their solving, linear spaces, linear transformations, and quadratic forms.
Course Aims: The students have to obtain knowledge and skills to apply the learned theory for modeling and solving real practical tasks, to do basic operations with matrices, to solving determinants and systems linear equations using the methods of Gauss and Kramer, to be able to distinguish the correspondence between algebraic objects, to determine their characteristics and to transfer them on others – difficult to examine.
Teaching Methods: lectures, tutorials, homework, and problem solving tests.
Requirements/Prerequisites: The students should have basics knowledge from school mathematics.
Assessment: permanent control during the semester including homework and two 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
References:
Basic Titles
Additional Titles
ANALYTIC GEOMETRY

Semester: 1 semester
Course Type: Lectures and tutorials
Hours per week: 3 lecture hours and 2 tutorial hours /Fall Semester
ECTS credits: 7.5 credits
Lecturer: Prof. Dr. Adrijan Borisov
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: adribor@swu.bg
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.
Short Description: The education of that discipline includes learning of vector calculus, affine coordinate systems and analytic representations of straight lines and planes. After introducing the cross ratio, the projective coordinate systems are used as well. The basic elements of the projective, of the affine and of the metric theory of the curves and the surfaces of the second degree are taught.
Course Aims: The students have to obtain knowledge and skills for application of the analytic apparatus for research of geometric objects.
Teaching Methods: lectures, tutorials, homework, problem solving tests.
Requirements/Prerequisites: Linear Algebra and Mathematical Analysis
Assessment: permanent control during the semester including homework and two 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
References:
Basic Titles
Additional Titles
MATHEMATICAL ANALYSIS I

**Semester**: 1 semester  
**Course Type**: lectures and seminars  
**Hours per Week**: 3 lecture hours and 2 seminars hour / Fall Semester  
**ECTS Credits**: 7.5 credits  
**Lecturers**: Associate Professor Vasil Grozdanov, Ph.D.  
**Department**: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: vassgroz@swu.bg  
**Course Status**: Compulsory course in Mathematics and Informatics B.C. Curriculum.  

**Short Description**: The main topics to be considered:  
- Numerical sequences  
- Numerical series  
- Limit, continuity and differentiability of functions  
- Integrals of functions of real variables  
- Applications of the integral calculation  

**Course Aims**: This course develops in details the problems of numerical sequences, numerical series, differential and integral calculation of functions of one real variable.  

**Teaching Methods**: Lectures, tutorials, homework, problem-solving tests. During the lectures students are acquainted with the basic theoretical material- definitions, theorems, applications, with the methods of theorems proofs. During seminars students solve practical problems. The knowledge obtained within the theoretical practice is used and it is also used in the process of problem solving.  

**Requirements/Prerequisites**: Basic knowledge of courses in Elementary Mathematics, Linear Algebra, Analytical Geometry is necessary.  

**Assessment**: permanent control during the semester including homework and two 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  

**References**:

**Basic Titles**:

**Additional Titles**:
INTRODUCTION TO PROGRAMMING

Semester: 1 semester
Type of Course: lectures and tutorials in computer lab
Hours per week: 4 hours lecture and 2 hours tutorials in computer lab/ Fall Semester
ECTS Credits: 7,5 credits
Lecturers: Assoc. Prof. PhD. Daniela Tuparova
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: ddureva@swu.bg
Course Status: Compulsory course in Mathematics and Informatics B.C. Curriculum.
Course description: Introduction to programming is the first course in scope of programming for the students of major “Informatics”. The course includes topics of syntax and semantics of programming languages construct and statements. The course is based on the C++.
Objectives: The main goal of the course is the students to master principles of programming and algorithms.
Methods of teaching: lectures, tutorials, discussions, problem passed method, Project based method.
Pre-requirements: No need.
Assessment and Evaluation Practical work and test- 50%
Final Exam 50%
The course is successful completed with at least 65% of all scores.
Registration for the Exam: coordinated with the lecturer and the Student Service Office
References:
1. Азълов П., Ф. Златарова, С++ в примери, задачи и приложения, Просвета, 2011
2. Крушков Х., Програмиране на С++, 1 част - въведение в програмирането
3. Тодорова М., Програмиране на C++, 1 част, СИЕЛА, 2010
4. Тодорова М., и колектив, Сборник от задачи по програмиране на С++, Първа част, Увод в програмирането, Технологика ООД, 2008
5. Интерактивни учебни материали, достъпни в он-лайн курса на адрес www.e-learning.swu.bg

FOREIGN LANGUAGE 1

Semester: Second semester
Course type: Seminars
Hours per week: 2 hours per week / Summer Semester
ECTS credits: 3,5
Lecturer: Assist. prof. Yanka Rangelova
Department: Faculty of Pedagogy
Course Status: Compulsory course in Mathematics and Informatics B.C. Curriculum.
Course description: Introducing students to the basic components of English phonology, morphology and syntax. It helps students learn and practice communicating in everyday situations including asking and answering questions, using the telephone, taking messages, initiating conversations, asking for directions, making invitations and closing conversations. Class activities include role-playing, small-group activities and short presentations. It also
develops skills in reading speed and comprehension. Students are introduced to reading strategies such as skimming, scanning, guessing meaning from context, previewing, predicting, making inferences and giving opinions. Reading materials include short stories, news articles, computer passages and a simplified novel.

**Goal:** The goals of the course is to enable students to speak and write effectively and confidently in their professional and personal lives. Students become acquainted with the basic terminology in the specific field.

**Teaching methods:** Seminars

**Prerequisites:** The knowledge acquired at high school is useful.

**Examination and assessment procedures:** The estimation of the acquired knowledge is based on a written exam

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

**References:**
4. Дончева, Лилия , Английски глаголни времена, Skyprint, 2009
5. Ранкова, М., Иванова, Ц., Английска граматика, Наука и изкуство, София, 2010

**MATHEMATICAL ANALYSIS II**

**Semester:** second semester

**Course Type:** lectures and seminars

**Hours per Week:** 3 lecture hours and 2 seminars hour / Summer Semester

**ECTS Credits:** 7,5 credits

**Lecturers:** Associate Professor Visil Grozdanov, Ph.D.

**Department:** Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,
tel. +35973588532, e-mail: vassgroz@swu.bg

**Course Status:** Compulsory course in Mathematics and Informatics B.C. Curriculum.

**Course Description:** The course in Mathematical Analysis II includes basic concepts of mathematical analysis: improper integral, functions of two and more variables; continuity of functions of several variables; partial derivatives, local and relative extrema; implicit functions; double and triple Riemann integral, and their applications for finding arias and volumes; line integrals of first and second type; surface integrals of first and second type; basic formulas for integrals of Mathematical Physics.

**Course Aims:** Students should obtain knowledge for Mathematical Analysis II, which is a basic mathematical discipline. This knowledge is necessary for studying, Mathematical Analysis III, Ordinary Differential Equations, Numerical Methods, Optimization.

**Teaching Methods:** lectures and seminars

**Requirements/Prerequisites:** Mathematical Analysis I
**Assessment:** permanent control during the semester including homework and two 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

**References:**

**ALGEBRA**

**Semester:** 2-nd semester

**Course Type:** Lectures and tutorials

**Hours per week:** 3 lecture hours and 2 tutorial hours /Summer Semester

**ECTS credits:** 7.5 credits

**Lecturer:** Assist. Prof. Dr. Ilinka Dimitrova

**Department:** Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,

tel. +35973588532, e-mail: ilinka_dimitrova@swu.bg

**Course Status:** Compulsory course in the B.S. Curriculum of Mathematics and Informatics.

**Short Description:** The education of that discipline includes some of the main notations of the semigroup and group theory, ring and field theory, algebraic polynomials. The definitions are introduced in an abstract way and explained with many examples. The Cayley theorem, the Lagrange theorem and the main theorem for the cyclic groups are proved. The main tools for investigations of the symmetric group are described and the importance of the symmetric group is underlined in applications. Characteristic of field and simple fields are introduced. There is detailed analysis of certain important rings. In the last part the classical polynomial questions like quotient/remainder theorem, Euclid’s algorithm, Horner’s scheme, roots of polynomials, symmetric polynomials are considered.

**Course Aims:** The students have to obtain knowledge and skills for the theoretical foundations of the semigroup and group theory, ring and field theory, and polynomials as well as the applications of this apparatus for solving some practical tasks, related to other
mathematical and informatical subjects. The obtained knowledge on this fundamental discipline are directed to be used by students in their education on other subjects.

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

**Requirements/Prerequisites:** The students should have basics knowledge from Number theory and Linear algebra.

**Assessment:** permanent control during the semester including homework and two 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

**References:**

**Basic Titles**

**Additional Titles**

**OBJECT-ORIENTED PROGRAMMING**

**Semester:** 2 semester

**Type of Course:** lectures and labs

**Hours per week:** 3 lectures + 2 labs / Summer Semester

**ECTS credits:** 7,5 credits

**Lecturers:** Assoc. Prof. Ph.D. Krasimir Yankov Yordzhev

**Department:** Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: yordzhev@swu.bg

**Course Status:** Compulsory course in the B.S. Curriculum of Mathematics and Informatics.

**Course description:** In the course students are introduced with methods and means of Object-oriented programming. The course is providing basic knowledge in development of algorithms, their programming using particular programming language and running and
testing of the programs under certain operation system. The structure and the main operational principles of the computer systems are given. The means and accuracy of information presentation are also considered. Some of the key classes of algorithms and data structures are studied. The main techniques of the structural approach of programming and their application using C++ programming language are introduced. The aim of the course is to teach the students with the techniques in development of algorithms and programs using C++ programming language. The knowledge will be used in the general theoretical, technical and some special courses.

**Objectives:**
Basic objectives and tasks:
- The students give knowledge for algorithm thinking;
- to give knowledge for methods and skills in Object-oriented programming in integrated development environment for visual programming;
- to give knowledge for Data structures, that can process with computer;
- to give knowledge for methods and skills in programming.
- to give knowledge for good style in programming;
- to give knowledge for basic principles when develop applications

**Methods of teaching:** lectures, tutorials, group seminars or workshop, projects, other methods

**Pre-requisites:** The course is continued of the course “Introduction in programming”. Basic knowledge in Mathematics.

**Exam:** Written examination and discussion at the end of the semester, individual tasks and the general student’s work during the semester.

**Registration for the Exam:** Coordinated with the lecturer and the Student Service Office

**References:**
7. Христо Крушков Програмиране на C++. Пловдив, Макрос, 2006.
11. Кент Рейслдф, Кен Хендерсон Borland C++ Builder. Освой самостоятельно

**GRAPH THEORY**

**Semester:** 2 semester

**Type of Course:** lectures and seminars

**Hours per week:** 2 lecture hours + 1 seminar hour / Summer Semester

**ECTS credits:** 4.0 credits
Lecturers: Prof. Ivan Mirchev, DSc
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,
tel. +35973588532, e-mail: mirchev@swu.bg
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.
Course description: The 1970s ushered in an exciting era of research and applications of networks and graphs in operations research, industrial engineering, and related disciplines. Graphs are met with everywhere under different names: "structures", "road maps" in civil engineering; "networks" in electrical engineering; "sociograms", "communication structures" and "organizational structures" in sociology and economics; "molecular structure" in chemistry; gas or electricity "distribution networks" and so on.
Because of its wide applicability, the study of graph theory has been expanding at a very rapid rate during recent years; a major factor in this growth being the development of large and fast computing machines. The direct and detailed representation of practical systems, such as distribution or telecommunication networks, leads to graphs of large size whose successful analysis depends as much on the existence of "good" algorithms as on the availability of fast computers. In view of this, the present course concentrates on the development and exposition of algorithms for the analysis of graphs, although frequent mention of application areas is made in order to keep the text as closely related to practical problem-solving as possible. Although, in general, algorithmic efficiency is considered of prime importance, the present course is not meant to be a course of efficient algorithms. Often a method is discussed because of its close relation to (or derivation from) previously introduced concepts. The overriding consideration is to leave the student with as coherent a body of knowledge with regard to graph analysis algorithms, as possible.
In this course are considered some elements of the following main topics:

- Introduction in graph theory (essential concepts and definitions, modeling with graphs and networks, data structures for networks and graphs, computational complexity, heuristics).
- Matching and assignment algorithms (introduction and examples, maximum-cardinality matching in a bipartite graph).
- The chinese postman and related arc routing problems (Euler tours and Hamiltonian tours, the postman problem for undirected graphs, the postman problem for directed graphs).
- The traveling salesman and related vertex routing problems (Hamiltonian tours, basic properties of the traveling salesman problem, lower bounds, optimal solution techniques, heuristic algorithms for the TSP).
Course Aims: Students should obtain basic knowledge in Graph theory and skills for solving optimization problems for graphs and networks.
Teaching Methods: lectures, tutorials, individual student’s work
Requirements/Prerequisites: Graphs, Discretion Programming
Assessment: 3 homework D1,D2,D3; 2 tests K1, K2 (project); written final exam
Rating: $= \frac{D1+D2+D3}{3} + \frac{0.5(K1+K2)}{2} + 0.3 (\text{Exam})$

Registration for the Exam: coordinated with the lecturer and Students Service Department

References:

Basic:
1. Ив.Мирчев, "Графи. Оптимизационни алgoritми в мрежи", Благоевград, 2001 г.
2. Ив.Мирчев, "Математическо онтимиране", Благоевград, 2000 г.

Additional:
3. Lih-Hsing Hsu , Cheng-Kuan Lin, Graph Theory and Interconnection Networks. 1420044818, 2008,

DIFFERENTIAL EQUATIONS AND APPLICATIONS

Semester: 3 semester
Course Type: lectures and seminars
Hours per week: 2 lecture hours and 2 tutorial hours /Fall Semester
ECTS credits: 7,0 credits
Lecturer: Assoc. Prof. Marek Tasev,
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: matassev@abv.bg
Course Status: Compulsory course from Mathematics and Informatics B.C. Curriculum.
Course Description: Mathematical methods of investigation are used in every field of science and technology. Differential Equations are the foundations of the mathematical education of scientists and engineers. The main topics are: First-order Linear equations with constant coefficients: exponential growth, comparison with discrete equations, series solutions; modeling examples including radioactive decay and time delay equation. Linear equations with non-constant coefficients: solution by integrating factor, series solution. Nonlinear equation: separable equations, families of solutions, isoclines, the idea of a flow and connection vector fields, stability, phase-plane analysis; examples, including logistic equation and chemical kinetics. Higher-order Linear equations: complementary function and particular integral, linear independence, reduction of order, resonance, coupled first order systems. Examples and PC-models of nonlinear dynamics, order and chaos, attractors. etc.
Course Aims: The main goal is the students to master the instruments and methods of modeling in science.
Teaching Methods: lectures, tutorials, homework, tests, etc.
Requirements/Prerequisites: Calculus I and II, Linear Algebra and Analytical Geometry.
Exam: tests, homework, final exam
Registration for the exam: Coordinated with lecturer and Students Service Department

References:
2. Попиванов П., П.Китанов, Обикновени диференциални уравнения. ЮЗУ Благоевград, 2000.
3. Борисов А., Ил.Гюденов. Математика, част 3. Елементи на интегралното смятане. Елементи на обикновените диференциални уравнения.Б-д .2003г
4. Босс. В. Лекции по математике. Дифференциальные уравнения. М. 2004г.
8. Байнов Д., К.Чимев, Ръководство за решаване на задачи по обикновени диференциални уравнения. ЮЗУ, Благоевград, 1992г. (учебник и ръководство на Д.Байнов от ПУ се намира в ЮЗУ библиотеката в голям брой екземпляри).
9. Пушкарков. Д. Математически методи на физиката.Ч. 1., ЮЗУ, Бл.1993г.
10. Эльсгольц. Л.Дифференциальные уравнения и вариационное вычисление. М. 2000.
11. Дорозов, А. Т.Драгунов. Визуализация и анализ инвариантных множеств динамических систем. Москва, 2003г.
12. Ризниченко. Г.Математические модели в биофизике и экологии..М, 2003г.
15. Методическо ръководство за решаване на задачи по математика, ч. 4, Техника, София, 1975г.- файловете от ръководството са достъпни за студентите в зала 1-115)

NUMBER THEORY

Semester: 3 semester
Type of the course: Lectures and tutorial
Hours per week: 2 lecture hours and 1 tutorial hour / Fall Semester
ECTS credits: 5,0 credits
Lecturer: Prof. Dr.Sc. Oleg Mushkarov
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: mushkarov@math.bas.bg
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.
Short Description: Main topics:
- Divisibility
- Primes and the Fundamental theorem of Arithmetic
- Congruences
- Fermat’s, Euler’s and Wilson’s theorems
- Quadratic residues
- Diophantine equations
- Arithmetic functions
**Course Aims:** To develop in details the basic notions and methods of elementary Number theory and their applications for solving problems of divisibility, linear and quadratic congruences and Diophantine equations.

**Teaching Methods:** Lectures, tutorials, homework, problem-solving tests. During the lectures students are acquainted with the basic theoretical material—definitions, theorems and applications. During seminars students solve practical problems. The knowledge obtained within the theoretical practice is used in the process of problem solving.

**Requirements/Prerequisites:** Basic knowledge of the courses in Elementary Mathematics, Linear and Abstract Algebra.

**Assessment:** Written exam on problem solving and on the theoretical material from the lectures.

**Registration for the exam:** Students and the lecturer agree on the convenient dates within the announced calendar schedule of examination session.

**References:**

**Basic Titles**

**Additional Titles**

**FOREIGN LANGUAGE 2**

**Semester:** 3 semester

**Course type:** Seminars

**Hours per week:** 2 hours per week / Fall Semester

**ECTS credits:** 4.0

**Lecturer:** Assist. prof. Yanka Rangelova

**Department:** Faculty of Pedagogy

**Course Status:** Compulsory course in Mathematics and Informatics B.C. Curriculum.

**Course description:** Introducing students to the basic components of English phonology, morphology and syntax. It helps students learn and practice communicating in everyday situations including asking and answering questions, using the telephone, taking messages, initiating conversations, asking for directions, making invitations and closing conversations. Class activities include role-playing, small-group activities and short presentations. It also develops skills in reading speed and comprehension. Students are introduced to reading strategies such as skimming, scanning, guessing meaning from context, previewing, predicting, making inferences and giving opinions. Reading materials include short stories, news articles, computer passages and a simplified novel.

**Goal:** The goals of the course is to enable students to speak and write effectively and confidently in their professional and personal lives. Students become acquainted with the basic terminology in the specific field.

**Teaching methods:** Seminars
Prerequisites: The knowledge acquired at high school is useful.
Examination and assessment procedures: The estimation of the acquired knowledge is based on a written exam
Registration for examination: coordinated with the lecturer and the academic affairs department
References:
4. Дончева, Лилия, Английски глаголни времена, Skyprint, 2009
5. Ранкова, М., Иванова, Ц., Английска граматика, Наука и изкуство, София, 2010

SCHOOL COURSE OF ALGEBRA AND ANALYSIS

Semester: 3 semesters
Course Type: lectures and tutorials
Hours per Week: 3 lecture hours, 3 tutorials hours / Fall Semester
ECTS Credits: 9.0 credits
Lecturers: Assoc. professor Kostadin Samardzhiev, PhD
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: k_samardzhiev@abv.bg
Course Status: Compulsory course in the Mathematics and Informatics B.S. Curriculum.
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 second course in specialty “mathematics and Informatics” follow the development of the 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 \( \mathbb{N} \). 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 \( a, b \) the equations \( a+x=b \) and \( a \times=b \) do not have solutions in the semiring of the natural numbers \( \mathbb{N} \). This lead to the necessity of enlargement of the semiring \( \mathbb{N} \) to the ring of the integer numbers \( \mathbb{Z} \), to the semifield of the fraction \( \mathbb{Q} \), and finally to the field rational numbers \( \mathbb{Q} \). 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 90:135.

**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 Exam:** coordinated with lecturer and Student Service Department

**References:**

**Basic Titles**
1. Денеке, Кл., Тодоров, К., Основи на аритметиката, Благоевград, 1999
2. С. Е. Ляпин, М. И. Баранова, Сборник задачи по елементарней математике,
Учпендгиз, 1963г.
3. Л. Чакалов и др. Сборник задачи по алгебра.
4. Ил.Гюдженов, К.Самарджиев Методическо ръководство за решаване на задачи по
математика,1994г.Благоевград
5. Ярослав Тагамлицки, Диференциално смятане, наука и изкуство София 1978г.
7.Чимев К.,А.Петрова-Денева Математика Благоевград 1985г.
8.Чимев К.,Гюдженов М.и др. Методическо ръководство за решаване на задачи по
математика Издателство Благоевград 1988г.
9.Ларичев П.А. Сборник задач по Алгебре част първа Учпедгиз 1961г. Москва

**Additional Titles**
1.Чимев К.,Мирчев И.,Щраков С.л. Математика Благоевград 1995г.
2.Киркоров И.,Недев А. Сборник задачи по висша математика част втора Издателство
Наука и изкуство София-1975г.
3.Миланов С.,Стойнов Н.,Денева А. и др. Висша математика 1,2,3,4,5 част Държавно
Издателство Техника София-1977г.

**SCHOOL COURSE OF GEOMETRY**

**Semester:** IV semester

**Course Type:** Lectures and tutorials

**Hours per week:** 3 lecture hours and 3 tutorial hours /Summer Semester

**ECTS credits:** 8.0 credits

**Lecturer:** Prof. Dr. Adrijan Borisov
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,
tel. +35973588532, e-mail: adribor@swu.bg
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics
Short Description: The course includes studying of the basic geometrical transformations: congruence, similarity, affinity. Some principal topics, connected with the area of polygon and volume of tetrahedron, are considered.
Course Aims: Students should obtain theoretical and practical knowledge, necessary for teaching High School Geometry.
Teaching Methods: lectures, tutorials, homeworks, problem solving tests.
Requirements/Prerequisites: High School Geometry
Assessment: written exam on topics from tutorials and on topics from lectures.
Registration for the exam: coordinated with the lecturer and student Service Department
References:
Basic Titles
Additional Titles

MATHEMATICAL OPTIMIZATION

Semester: IV semester
Course Type: Lectures and tutorials
Hours per week: 3 lecture hours and 2 tutorial hours /Summer Semester
ECTS credits: 7,0 credits
Lecturer: Assoc. Prof. Stefan Stefanov, PhD
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,
tel. +35973588532, e-mail: stefm@swu.bg
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics
Short Description: The course in Optimization (Mathematical Programming) includes basic results and methods for solving various types optimization problems and related topics: nonlinear optimization problems, linear optimization problems (simplex method, duality in linear optimization, transportation problem, assignment problem), matrix games (John von Neumann minimax theorem, graphical method for solving 2 x 2, 2 x n, and m x 2 games, relation between matrix games and linear optimization), convex analysis (convex sets, sum of sets and product of a set with a real number, projection of a point onto a set, separation of convex sets, extreme points, cones, polar cones, representation of convex cones, representation of convex sets, polyhedrons, convex functions, directional derivatives, subgradients and subdifferentials), convex optimization problems (Kuhn-Tucker theorem), quadratic optimization problems.
**Course Aims:** Students should obtain basic knowledge and skills for solving optimization problems under consideration.

**Teaching Methods:** lectures and tutorials

**Requirements/Prerequisites:** Mathematical Analysis, Linear Algebra, Analytic Geometry.

**Assessment:** written final exam

**Registration for the Exam:** coordinated with the lecturer and Students Service Department

**References:**

**Basic Titles:**

**Additional Titles:**

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**OPERATION SYSTEMS**

**Semester:** 4 semester

**Type of Course:** lectures and tutorials in computer lab

**Hours per week:** 2 hours lecture and 2 hours tutorials in computer lab/ Summer Semester

**ECTS credits:** 5.5 credits

**Lecturers:** Assoc. Prof. Georgi Tuparov, PhD

**Department:** Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: georgette@swu.bg

**Course Status:** Compulsory course in the B.S. Curriculum of Mathematics and Informatics.

**Course description:** The course is introduction in area of operation systems. Basic knowledge and skills in Linux and Microsoft Windows are covered.

**Objectives:**
The student should obtain knowledge of:
- Basic principles of operation systems.
- Basic administration skills in area of operation systems.

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

**Pre-requirements:** Database systems (core course)

**Assessment and Evaluation**
- Pre-exam test – 30%
- Final Test- 70%

**The course is successful completed with at least 51% of all scores.**

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

**References**

PEDAGOGY

**Semester:** 4 semester  
**Type of Course:** lectures and seminars  
**Hours per week:** 2 hours lecture and 2 hours seminars/ Summer Semester  
**ECTS credits:** 5.5 credits  
**Lecturers:** Assoc. prof. D.Sc. Lidiya Tsvetanova - Churukova  
**Department:** Department of Pedagogy, Faculty of Pedagogy, South-West University “Neofit Rilski” – Blagoevgrad, tel. 0888492612, e-mail: lidycveta@swu.bg  
**Course Status:** Compulsory course in the B.S. Curriculum of Mathematics and Informatics.  
**Course description:** The purpose of the preparation of this course is for students to master the scientific bases of institutional organized training. It is important to develop their theoretical thinking, their ability to penetrate into the essence of didactic phenomena and processes, to analyze the legitimate links between tradition and innovation in education, navigate the changing pedagogical reality. Their attention will be offered to current theoretical issues and concepts arising from practice, the system of organized and targeted training in Bulgaria and the world. By modern interpretation of the problems students will be able to master thoroughly the nature, regularities, technology and training.  
**Methods of teaching:** The training uses, as traditionally established and interactive methods (multimedia presentations, case studies, etc.). Examination grade is based on the successful completion of the written examination and protection of training portfolio. Practical exercises thematically follow lectures. Continuous assessment during the semester grade is based on the fulfilled independent work by students and the verification tests in modules or tests. The share of current assessment is 60% in the final grade of the student.  
**Assessment and Evaluation:** written exam  
**Registration for the Exam:** coordinated with the lecturer and the Student Service Office  
**References:**  

**NUMERICAL ANALYSIS**

**Semester:** V semester
**Course Type:** Lectures and labs
**Hours per week:** 3 lecture hours and 2 lab hours /Fall Semester
**ECTS credits:** 8,0 credits
**Lecturer:** Assoc. Prof. Stefan Stefanov, PhD
**Department:** Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: stefm@swu.bg
**Course Status:** Compulsory course in the B.S. Curriculum of Mathematics and Informatics
**Course Description:** The course in Numerical Analysis includes basic numerical methods of mathematical analysis, algebra, and differential equations: interpolation and least squares data fitting as methods for approximating functions given by tabulated data; numerical differentiation; numerical integration – Newton-Cotes and Gauss quadrature formulas; numerical solution of nonlinear equations; numerical solution of linear systems of algebraic equations; numerical solution of the initial-value problem for ordinary differential equations of first order; numerical solution of the boundary value problem for ordinary differential...
equations of second order; and variational methods for solving operator equations (including differential equations).

**Course Objectives:** Students should obtain knowledge and skills for numerical solutions of problems in the area of mathematical analysis, algebra and differential equations, which are applicable for solving various problems.

**Teaching Methods:** lectures, tutorials and lab exercises

**Requirements/Prerequisites:** Mathematical Analysis, Linear Algebra, Analytic Geometry, Differential Equations

**Assessment:** written final exam covering problems /omitted in case the average grade of two current problem tests is higher than Very Good 4.50/ (grade weight is 30 %) and theory on two topics (grade weight is 30 %); two homework (grade weight is 20 %) and two projects (grade weight is 20 %)

**Registration for the Exam:** coordinated with lecturer and Student Service Department

**References:**

**Basic Titles:**

**Additional Titles:**

**DIFFERENTIAL GEOMETRY**

**Semester:** 5 semester

**Course Type:** Lectures and tutorials

**Hours per week:** 3 lecture hours and 2 tutorial hours / Fall Semester

**ECTS credits:** 8,0 credits

**Lecturer:** Prof. Dr. Adrian Borisov

**Department:** Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: adribor@swu.bg

**Course Status:** Compulsory course in the B.S. Curriculum of Mathematics and Informatics.

**Short Description:** The course includes: studying of basic themes of the classical differential geometry of the curves, the one-parametric sets of straight lines and the surfaces in the three-dimensional real Euclidean space.

**Course Aims:** The students have to obtain knowledge and skills for application of the differential-geometric methods for learning of geometric objects.

**Teaching Methods:** Lectures, tutorials, home works, problem solving tests.

**Requirements/ Prerequisites:** Analytic Geometry, Mathematical Analysis, Differential Equations.
Assessment: written exam on topics from tutorials and on topics from lectures.

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

References:

Basic Titles

Additional Titles:

**PSYCHOLOGY**

**Semester:** V semester

**Type of Course:** lectures and seminars

**Hours per week:** 2 hours lectures and 1 hour seminar / Fall Semester

**ECTS credits:** 5.0 credits

**Lecturers:** Assoc. Prof. Maria Mutafova, PhD

**Department:** Department of Psychology, Faculty of Philosophy, South-West University “Neofit Rilski” – Blagoevgrad, e-mail: mariamutafova@swu.bg

**Course Status:** Compulsory course in the B.S. Curriculum of Mathematics and Informatics.

**Course description:** Bachelors acquire specialized theoretical competence in Psychology (General, Developmental and Educational psychology) course. The purpose of the proposed training is students to benefit from advances in world practice in General, Developmental and Educational psychology, and building skills to interpret data from empirical studies for application of appropriate methods of psychological diagnosis, research design and psychological characteristics of the interaction between teachers and students of varying ages. Competence, skills and research culture in Psychology is stimulated.

**Methods of teaching:** lectures, seminars, tutorials, discussions.

**Pre-requisites:** No need

**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

**References:**

**PROBABILITY AND STATISTICS - METHODOLOGY AND TECHNOLOGY**

**Semester:** VI semester

**Type of Course:** lectures and tutorials in computer lab

**Hours per week:** 3 hours lectures and 2 hours tutorials in computer lab / Summer Semester

**ECTS credits:** 8.0 credits

**Lecturers:** Assoc. Prof. Elena Karashtranova, PhD
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.

Course description: In this course questions of Probability and Mathematical Statistics are considered. Algorithms connected with finding structural and numerical characteristics of graphs are represented. Basic notion of Probability and Statistics are considered connected with Theory of Estimations and Decision Theory in case of big and small samples, testing of hypothesis based on models about the probability distributions of the features in the investigated population.

Objectives: The students should obtain knowledge and understanding that the intercourse character needs to discover the connection Mathematics- Informatics- Physics- Economics and much more other sciences:

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

Pre-requirements: It is helpful the students have some knowledge in Analysis and Information Technology

Assessment and Evaluation: Three semestrials tests witch estimations will have part in the final estimation (50%)

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

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

References:

Basic Titles
1. Димитров, Б., Янев, Н., Вероятности и статистика, 2001, София.
2. Каращранова Е., Интерaktivno обучение по вероятности и статистика, Благоевград, 2010
3. Карлберг К., Бизнес анализ с Microsoft Excel, СофтПрес 2003
7. Калинов К., Статистически методи в поведенческите и социалните науки, НБУ, 2010

Additional Titles:
2. Въндеев Д., Теория на вероятностите и Статистика за Физическия факултет на СУ - http://stochastics.fmi.uni-sofia.bg/
4. Калинов К., Статистически методи в поведенческите и социалните науки, София, 2001
DATABASE

Semester: VI semester
Course Type: lectures and lab exercises
Hours per week/FS/SS: 3 lecture hours and 2 lab exercise hours / Summer Semester
ECTS credits: 8.0
Lecturer: Prof. Peter Milanov, PhD
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: milanov@swu.bg
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.
Course Description: In this course we will present Database Theory. Course contains programmer/analyst – oriented in database management, practical training.
Course Aims: Students should obtain knowledge and skills for designing of real database.
Teaching Methods: lectures, demonstrations and work on project
Requirements/Prerequisites: Linear algebra, Computer languages.
Assessment: course project
Registration for the Exam: coordinated with the lecturer and Student Service Department
References:
1. Vidya Vrat Agarwal, Beginning C Sharp 5.0 Databases, 2012 New York Press,
5. Павел Азълов. Бази от данни. Релационен и обектен подход, техника, 1991 г.

DIDACTICS OF MATHEMATICS I

Semester: 6 semester
Course Type: Lectures
Hours per week: 2 lecture hours / Summer Semester
ECTS credits: 5.5 credits
Lecturer: Prof. Dr. Iliya Dimitrov Gyudzhenov
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. ++35973588545, e-mail: iliadgl@swu.bg
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics
Short Description: The education of that discipline includes some of the General Methodology of teaching mathematics.
Course Aims: To prepare the students, teach pupil in mathematics at school.
Teaching Methods: lectures, homework, and problem solving tests.
**Requirements/Prerequisites:** The students should have basics knowledge from school mathematics.

**Assessment:** permanent control during the semester including homework and two 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

**References:**

**Basic Titles**

1. Ganchev Iv. and others, Methodology of teaching mathematics (General Methodology), Blagoevgrad, 2002.

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**SCHOOL COURSES OF INFORMATICS AND ICT**

**Semester:** 6 semester

**Type of Course:** lectures and tutorials in computer lab

**Hours per week:** 3 hours lecture and 3 hours tutorials in computer lab / Summer Semester

**ECTS credits:** 8,5 credits

**Lecturers:** Assoc. Prof. PhD. Daniela Tuparova

**Department:** Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,
tel. +3597358532, e-mail: ddureva@swu.bg

**Course Status:** Compulsory course in the B.S. Curriculum of Mathematics and Informatics.

**Course description:** The course includes:

- State of the art in the secondary school courses of informatics and ICT. State educational Standards;
- Basic modules of informatics and ICT secondary school curriculum
- Programming in Pascal
- Programming in QBascic

**Objectives:** The student should obtain knowledge of:

- Educational standards in Informatics and ICT.
- School’s curriculums in Informatics and ICT
- Programming languages used in the secondary schools.

**Methods of teaching:** lectures, tutorials, discussions, problem passed method, Project based method.

**Pre-requirements:** Programming, Data structures, Discrete Mathematics, ICT, Operating Systems

**Assessment and Evaluation**

- Practical work-50%
- Final Exam- 50%

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

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

**References**
1. All school books in informatics and ICT, approved by Bulgarian Ministry Of Education
2. Jurnal Mathematics and Informatics, Sofia- In Bulgarian
3. Jurnal Informatics and education- in Russian

**DIDACTICS OF INFORMATICS AND ICT**

**Semester:** 7 semester  
**Type of Course:** lectures and tutorials in computer lab  
**Hours per week:** 2 hours lecture and 2 hours tutorials in computer lab / Fall Semester  
**ECTS credits:** 7,0 credits  
**Lecturers:** Assoc. Prof. PhD. Daniela Tuparova  
**Department:** Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: ddureva@swu.bg  
**Course Status:** Compulsory course in the B.S. Curriculum of Mathematics and Informatics.  
**Course description:** The course includes:  
- Methods and principles of instruction in secondary school courses in Informatics and ICT;  
- Planning and organization of lessons in Informatics and ICT;  
- Specific methods of instruction of basic modules in Informatics and ICT at the secondary school.  

**Objectives:** The student should obtain knowledge of:  
- Educational objectives in secondary school courses of Informatics and ICT.  
- Ways of implementation of basic methods and rules of instruction.  
- Planning and development of school lessons in Informatics and ICT.  
- Development of problem solving  
- Analysis of school lessons in Informatics and ICT.  

**Methods of teaching:** lectures, tutorials, discussions, problem passed method, Project based method.  

**Pre- requirements:** psychology, Pedagogy, Operating Systems, Programming Languages, Data Structures, Word-processing, spreadsheets, Computer’s networks, Database, School courses of informatics and ICT  

**Assessment and Evaluation**  
Project- 40%  
Practical work-30%  
Final Exam- 30%  

**The course is successful completed with at least 65% of all scores.**  
**Registration for the Exam:** coordinated with the lecturer and the Student Service Office  

**References**  
1. Dureva D., Problems in didactics of informatics and ICT, 2003- in Bulgarian  
2. Jurnal Mathematics and Informatics, Sofia- In Bulgarian  
3. Jurnal Informatics and education- in Russian
DIDACTICS OF MATHEMATICS II

Semester: 7-th semester  
Course type: lectures and seminars  
Hours per week: 2 hours lecture and 2 hours seminars / Fall Semester  
ECTS credits: 7.0 credits  
Lecturers: Assoc. Prof. Elena Karashtranova, PhD  
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: helen@swu.bg  
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.  
Description of the course: The subject includes problems of the Special Methodology of teaching mathematics, that is the themes: functions, relations and operations, equations and inequations, samenesses (identities) and likenesses, vector, geometric figures (Shapes) in the plane and in the space.  
Purpose (Aim) of the subject: To prepare the students, teach pupil in mathematics at school.  
Methods of teaching: Lectures and practices (exercises)  
Precursory conditions: Knowledge in the content of the school course in mathematics, and also knowledge in psychology and pedagogy.  
Appraisal: Examination in written form  
Registration for the examination: concerted with the teacher and the school department.  
References:  
2. Ganchev Ivan and others “Methodology of teaching mathematics from 8th to 11th class” Sofia 1998

OBSERVATION OF LESSONS IN MATHEMATICS AT SCHOOL

Semester: 7-th semester  
Course type: observation in real educational environment  
Hours per week: 1 hour observation and discussions in lab / Fall Semester  
ECTS credits: 2.0 credits  
Lecturers: Assistant Prof. Mariana Katsarska  
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: mariana@swu.bg  
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.  
Course description: The course introduces students to their future profession. The students observe lessons taught by supervised teachers at school, conferencing observed lessons and present three analyses of observed lessons in writing.  
Course aims: The aim of the course is to give students an idea of the basic requirements for a lesson in mathematics, the skills to develop various kinds of lessons, to select and streamline tasks offered to students, to evaluate the performance of the individual student and the class as a whole.  
Methods of teaching: tutorials - observations at school, discussion.
Pre-requisites: Didactics of Mathematics I and II, and School course in Mathematics.

Assessment and Evaluation

- Participation in discussions - 60%
- Analysis of the lessons – 40%.

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

References:
1. School books of Mathematics approved by Ministry of education and used in cooperated schools by supervised teachers.

OBSERVATION OF LESSONS IN INFORMATICS AND ICT AT SCHOOL

Semester: 7-th semester
Course type: observation in real educational environment
Hours per week: 2 hours observation and discussions in lab / Fall Semester
ECTS credits: 4.0 credits
Lecturers: Assoc. Prof. Daniela Dureva
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: ddureva@swu.bg

Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.
Course description: During the course students observe lessons in school. They participate in discussions about used methods, interactions etc.

Objectives:

- The student should obtain knowledge and skills to:
  - Evaluate and analysis of lessons carried out in secondary or high schools.
  - Determinate basic components of observed lessons as methods, structure of lessons, principles, interactions among teacher and students etc.

Methods of teaching: observation, discussions, project based method.
Pre-requisites: Pedagogy, Pshycology, School courses of informatics and ICT
Assessment and Evaluation

Semester’s grading - 100%
Assessment is based on the following components:

- Participation in discussions after observation (30%);
- Portfolio with collected notes of observations (50%);
- Lesson plan for 1 lesson in Informatics (10%);
- Lesson plan for 1 lesson in Informatics (10%);

The course is successful completed with at least 53% of all scores.

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

References:
2. School books of ICT and Informatics approved by Ministry of education and used in cooperated schools by supervised teachers.
AUDIOVISUAL AND INFORMATION TECHNOLOGIES IN TEACHING

**Semester:** 8 semester  
**Type of Course:** lectures and tutorials in computer lab  
**Hours per week:** 1 hour lecture and 1 hour tutorials in computer lab / Summer Semester  
**ECTS credits:** 2.5 credits  
**Lecturers:** Assoc. Prof. PhD. Daniela Tuparova  
**Department:** Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,  
tel. +35973588532, e-mail: ddureva@swu.bg  
**Course Status:** Compulsory course in the B.S. Curriculum of Mathematics and Informatics.  
**Course description:** The course includes:  
- Tools and technology in education  
- Basic characteristics of educational software  
- Multimedia in education  
- Internet in education  
- Technologies of E-learning  
**Objectives:** The student should obtain knowledge of:  
- Rules of using educational software  
- Development and presentation of learning materials;  
- Use of Internet services for educational goals  
- E-learning  
**Methods of teaching:** lectures, tutorials, discussions, problem passed method, Project based method.  
**Pre-requisites:** psychology, Pedagogy, Word-processing, spreadsheets, Computer’s networks,  
**Assessment and Evaluation**  
- Project- 55%  
- Final Exam- 45%  
**The course is successful completed with at least 65% of all scores.**  
**Registration for the Exam:** coordinated with the lecturer and the Student Service Office  
**References:**  
2. HTML в лесни стъпки, Софтпрес, 2000  
3. Елизабет Кастро, HTML за World Wide Web, Инфодар, 2000  
4. Даниъл Грей, Професионален дизайн в Web, Софтпрес, 2000  

PEDAGOGICAL PRACTICE IN MATHEMATICS

**Semester:** 8-th semester  
**Course type:** Practice in real environment  
**Hours per week:** 2 hours tutorials / Summer Semester
ECTS credits: 2.5 credits
Lecturers: Assistant Prof. Mariana Katsarska
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neoﬁt Rilski” – Blagoevgrad, tel. +35973588532, e-mail: mariana@swu.bg

Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.

Course description: The course prepares students to their future profession. Each student taught two lessons – one in the secondary school grades 5-8 and one in the upper grades 8-12. The other of the students observed lessons.

Course aims: The aim of the course is to give students an idea of the basic requirements for a lesson in mathematics, the skills to develop various kinds of lessons, to select and streamline tasks offered to students, to evaluate the performance of the individual student and the class as a whole.

Methods of teaching: observations at school, discussions, teaching
Pre-requirements: Didactics of Mathematics I and II, and School course in Mathematics.

Assessment and Evaluation

- Presentation of two lessons at school – 60%
- Presented analysis of three lessons – 40%.

Registration for the Exam: coordinated with the lecturer and the cooperative teacher.

References:
1. School books of Mathematics approved by Ministry of education and used in cooperated schools by supervised teachers.

PEDAGOGICAL PRACTICE IN INFORMATICS

Semester: 8-th semester
Course type: Practice in real environment
Hours per week: 2 hours practice / Summer Semester
ECTS credits: 2.5 credits
Lecturers: Assoc. Prof. Daniela Dureva
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neoﬁt Rilski” – Blagoevgrad, tel. +35973588532, e-mail: ddureva@swu.bg

Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.

Course description: During the practice students obtain basic competences about lessons planning, classes organizing, conducting of lessons in real school environment. The practice is carried out under supervising of cooperative teacher (mentor) and responsible university lecturer.

Objectives:
The student should obtain knowledge and skills to:
- Plan activities for lessons and classes management;
- Conduct training in real school environment.

Methods of teaching: observation, discussions, teaching.

Pre - requirements: Pedagogy, Psycology, School courses of informatics and ICT

Assessment and Evaluation
Semester’s grading - 100%
Assessment is based on the following components:
- Lesson’s plans for 2 lessons in Informatics or ICT (25%);
- Performance of 2 lessons in real school environment (75%);

The course is successful completed with at least 53% of all scores.

Registration for the Exam: coordinated with the lecturer and the cooperative teacher

References:
2. School books of ICT and Informatics approved by Ministry of education and used in cooperated schools by supervised teachers.
3. Dureva D. Problems of didactics in informatics and ICT, 2003, Blagoevgrad

PRE-GRADUATION PEDAGOGICAL PRACTICE IN MATHEMATICS

Semester: 8-th semester
Course type: Practice in real environment
Hours per week: 3 hours practice / Summer Semester
ECTS credits: 3.0 credits
Lecturers: Assistant Prof. Mariana Katsarska
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,
tel. +35973588532, e-mail: mariana@swu.bg

Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.

Course description: The course prepares students to their future profession. By Order of the Rector students are assigned to a school for 10 weeks practice. Each week they presented three lessons and observed two lessons of their colleagues. For the whole practice they must present 15 lessons at Secondary school and 15 lessons at High school. The cooperative teacher (mentor) assists students in the development of the lessons and oversees the work of trainees in school. If the trainee is not prepared for the lesson, the mentor and the director of the school may require interruption of the practice.

Course aims: The aim of the course is to give students an idea of the basic requirements for a lesson in mathematics, the skills to develop various kinds of lessons, to select and streamline tasks offered to students, to evaluate the performance of the individual student and the class as a whole.

Methods of teaching: observations at school, discussion, teaching.

Pre-requisites: Didactics of Mathematics I and II, and School course in Mathematics.

Assessment and Evaluation
- Presentation of two or three lessons at school – 60%
- Presented papers of the lessons – 40%.

Registration for the Exam: coordinated with the lecturer and the cooperative teacher.

References:
1. School books of Mathematics approved by Ministry of education and used in cooperated schools by supervised teachers.
PRE-GRADUATION PEDAGOGICAL PRACTICE IN INFORMATICS

Semester: 8-th semester  
Course type: Practice in real environment  
Hours per week: 2 hours practice / Summer Semester  
ECTS credits: 2,5 credits  
Lecturers: Assoc. Prof. Daniela Dureva  
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, 
tel. +35973588532, e-mail: ddureva@swu.bg  
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.  
Course description: During the practice student obtain basic competences about lessons planning, classes organizing, conducting of lessons in real school environment. The practice is carried out under supervising of cooperative teacher (mentor). Each student has to perform 30 lessons in classes according to schedule of supervised teacher.  
Objectives:  
The student should obtain knowledge and skills to: 
- Plan activities for lessons and classes management;  
- Conduct training in real school environment.  
Methods of teaching: observation, discussions, teaching.  
Pre - requirements: Pedagogy, Psychology, School courses of informatics and ICT, Hospetition, Practice in school  
Assessment and Evaluation  
Semester’s grading - 100%  
Assessment is based on the following components:  
- Lesson’s plans for lessons in Informatics or ICT (20%);  
- Performance of lessons in real school environment (80%);  
The course is successful completed with at least 53% of all scores.  
Registration for the Exam: coordinated with the lecturer and the cooperative teacher  
References:  
2. School books of ICT and Informatics approved by Ministry of education and used in cooperated schools by supervised teachers.  
3. Dureva D. Problems of didactics in informatics and ICT, 2003, Blagoevgrad

EDUCATION AND DEVELOPMENT OF SPECIAL NEEDS PUPILS

Semester: 8 semester  
Type of Course: lectures and seminars  
Hours per week: 2 hour lecture and 1 hour seminar / Summer Semester  
ECTS credits: 4,0 credits  
Lecturers: Assoc. Prof. Pelagia Terziyska, PhD  
Department: Department of Pedagogy, Faculty of Pedagogy, South-West University “Neofit Rilski” – Blagoevgrad, e-mail: pterziyska@abv.bg  
Course Status: Compulsory course in the B.S. Curriculum of Mathematics and Informatics.  
Course description: The course is aimed at training, development and socialization of children with special educational needs integrated into mainstream schools. Designed for the
acquisition of knowledge about the specifics of working with these students. The main objective is introduces the students with the most effective methods, approaches and the pedagogical technologies for teaching, of different groups of pupils with SEN, to clarify the psychological and pedagogical problems of education and social adaptation in the midst from their peers in norm.

**Content of the course:**
The main substantive points were: initial knowledge of the main characteristics of children and pupils with SEN; specifics of the educational process in the mainstream school in terms of integrated training; features of academic activities and teaching methods for different groups of pupils with SEN; specific requirements to the teacher.

**Teaching and assessment:**
Training includes lectures. Knowledge available in the system, using interactive methods - case studies, discussions, debates, role-plays, planning and conducting analysis mini-experiments behavior of children with SEN in different situations and different social and cultural environment. There were strict criteria for the development of papers, which are transmitted within a given period for checking. After that all papers will be discussed in class.

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

**References:**
4. Strully, J., & Strully, C. (1996). Friendships as an educational goal: What we have learned and where we are headed. In W. Stainback & S.

**OPTIONAL COURSES**

**COMPUTER ARCHITECTURES**

**Semester:** 3-rd semester
**Course type:** Lectures
**Hours per week:** 3 lecture hours / Fall Semester
**ECTS Credits:** 5.0 credits
**Lecturer:** Prof. Nina Sinyagina, PhD
**Department:** Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532
**Course Status:** Optional course in the B.S. Curriculum of Mathematics and Informatics

**Description of the course:** The course covers the advanced computer systems, their programming and functional model, introduce information in computer organization and memory types (major, operational, permanent, outdoor, etc.), system interruptions, features and technology solutions, conveyor ADP modes, system bus (types and structures), some problems of modern computer architectures (RISC, parallel and multiprocessor computer systems).

**Scope of the course:** Obtaining knowledge of a systematic overview of the modern computer architecture, systems to form the theoretical and practical basis for better understanding of the work of computers to acquire skills in programming in assembly language.

**Methods:** discussions, practical exercises of the codes under consideration

**Preliminary requirements:** The students must have basic knowledge from mathematics.

**Evaluation:** permanent control during the semester (two written exams) and final exam.

**Registration for the Course:** by request at the end of the current semester

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

**References:**

2. Боровска Пламенка, Компютърни системи, второ преработено издание, Сиела, София, 2007
3. Брадли, Д. “Програмиране на асемблер за персонален компютър IBM/PC” Техника, София, 1989
8. Въчовски И., Наръчник по 32-разредни микропроцесори.
9. Ско т Мюлер, Компютърна енциклопедия, Част 1, 2, 3, СофтПрес 2002 г.
10. Бари Прес, Компютърна библия I и II част, АлексСофт,1998 г.
11. Шиндельд, Компютърни мрежи, СофтПрес, 2003 г.
12. Людмила Иванова, Въведение в РС, изд. БАН, 2007 г.

**Web**

1. http://www.computers.bg

**Additional titles**

1. Wikipedia.ORG - Internet енциклопедия.
2. 3DNow: Technology Manual

DISCRETE MATHEMATICS

Semester: 3-rd semester
Course type: Lectures
Hours per week: 3 lecture hours / Fall Semester
ECTS Credits: 5.0 credits
Lecturer: Assoc. Prof. Dr. Sc. Slavcho Shtrakov
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,
tel. +35973588532, e-mail: shtrakov@swu.bg
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics
Course description: The course is an introduction in Discrete Structures used as a mathematical model in different computer science areas: logic, operations and relations in finite algebraic structures, representations of them as data structures, Boolean algebras, graphs, complexity of algorithms, combinatorics, finite automata etc.
Course aims: Non-trivial introduction in some important for Computer science areas, allowing the students to use effectively their knowledge in solving combinatorial problems.
Teaching methods: lectures, tutorials, group seminars or workshop, projects, other methods
Requirements/ Prerequisites: Basic knowledge in Mathematics.
Materials: Textbook and manual of the course are published, instructions for every laboratory theme and exemplary programs; access to web sites via Internet.
Evaluation: Written examination and discussion at the end of the semester, individual tasks and the general student’s work during the semester.
Registration for the Course: by request at the end of the current semester
Registration for the exam: coordinated with the lecturer and student Service Department
References:
1. Денев, Й., С. Щраков, Дискретна математика, Благоевград, 1995
2. Павлов, Р., С. Радев, С. Щраков, Математически основи на информатиката, Благоевград, 1997
3. Денев, Й., Р. Павлов, Я. Деметрович, Дискретна математика, София, 1984
7. С.В.Яблонски, Г.П.Гаврилов, В.Б.Кудрявцев, Функции алгебры логики и классы Поста, М.,1966.
INFORMATION TECHNOLOGY

Semester: 3 semester  
**Type of Course:** lectures and tutorials in computer lab  
**Hours per week:** 2 hour lecture and 1 hour tutorials in computer lab / Fall Semester  
**ECTS credits:** 5.0 credits  
**Lecturers:** Assoc. Prof. PhD. Daniela Tuparova  
**Department:** Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,  
tel. +35973588532, e-mail: ddureva@swu.bg  
**Course Status:** Optional course in the B.S. Curriculum of Mathematics and Informatics.  
**Course description:** The course is introduction in Information systems and technologies. The basic concepts and principles in ICT such as Information, Information processes, operating systems, office software, multimedia and computer graphics, presentation of information etc. are discussed. The course is an extension of the secondary school course in ICT  
**Objectives:** The student should obtain knowledge of:  
- Basic concepts in ICT  
- Types of system and application software.  
- Most popular services in Internet;  
- Information security and ethical and Law Issues of ICT.  
**Methods of teaching:** lectures, tutorials, discussions, problem passed method, Project based method, e-learning technologies  
**Pre- requirements:** No  
**Assessment and Evaluation**  
Project- 20%  
Formatitive Tests- 30%  
Final Test- 5035%  
**The course is successful completed with at least 65% 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  
**References:**  

COMPUTER MODELS IN NATURAL SCIENCES

Semester: 4-th semester  
**Course Type:** lectures and labs  
**Hours per week:** 2 lecture hours and 1 lab hour / Summer Semester  
**ECTS Credits:** 4.0  
**Lecturer:** Assoc. Prof. Marek Tasev, PhD
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics

Course Description: The course “Computer model in science” could be used as a basic or optional one for all subjects aiming broad university preparation. The course is adapted and applied in teaching in the departments “Informatics”, “Pedagogy of Teaching of Mathematics and Computer Science”, “Pedagogy of Teaching of Physics and mathematics”. To take that course it is enough for the student to have accomplished regular mathematics and science secondary school courses. Among the main objectives of the course (in times of information revolution and new information technologies) is the good and timely orientation and the acquisition of general mathematical and scientific knowledge by students - it is adapted first of all for non-physics students.

The course comprises of separate modules and mostly of computer experiments. For each PC-experiment with color computer animation, graphics, numerical results, explanations are provided. There are experiments in mechanics, thermodynamics and molecular physics, oscillations and waves, electricity and magnetism; optics, quantum physics, math. ecologies, biophysics, nonlinear economics, astrophysics, etc. The possibility in the course of independent work the change the parameters and observe the results of a computer experiment allows the student to investigate interactively each model in each topic. All that results in promotion of interest towards scientific knowledge and new information technologies application along with learning motivation. PC-models in Mathematical methods of investigation are used in every field of science and technology. Differential Equations are the foundations of the mathematical education of scientists and engineers. (PC –models also use a model of exponential growth, comparison with discrete equations, series solutions; modeling examples including radioactive decay and time delay equation, integrating factor, series solution. nonlinear equation , separable equations, families of solutions, isoclines, the idea of a flow and connection vector fields, stability, phase-plane analysis; examples, including logistic equation and chemical kinetics. resonance, coupled first order systems, examples and PC-models of nonlinear dynamics, order and chaos, attractors, etc.)

Course Aims: The main goal is the students to master the instruments and methods of modeling in science.

Teaching Methods: lectures, tutorials, homeworks, tests, etc.

Requirements/Prerequisites: Calculus I and II, Linear Algebra and Analytical Geometry, Differential Equations.

Exam: tests, home works, final exam.

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

References:

ALGORITHMS FOR GRAPHS AND NETWORKS

Semester: 4 semester
Course Type: Lectures
Hours per week: 3 lecture hours / Summer Semester
ECTS credits: 4,0 credits
Lecturer: Prof. Ivan Mirchev, DSc
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: mirchev@swu.bg
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.

Short Description: The 1970s ushered in an exciting era of research and applications of networks and graphs in operations research, industrial engineering, and related disciplines. Graphs are met with everywhere under different names: "structures", "road maps" in civil engineering; "networks" in electrical engineering; "sociograms", "communication structures" and "organizational structures" in sociology and economics; "molecular structure" in chemistry; gas or electricity "distribution networks" and so on.

Because of its wide applicability, the study of graph theory has been expanding at a very rapid rate during recent years; a major factor in this growth being the development of large and fast computing machines. The direct and detailed representation of practical systems, such as distribution or telecommunication networks, leads to graphs of large size whose successful analysis depends as much on the existence of "good" algorithms as on the availability of fast computers. In view of this, the present course concentrates on the development and exposition of algorithms for the analysis of graphs, although frequent mention of application areas is made in order to keep the text as closely related to practical problem-solving as possible.

Although, in general, algorithmic efficiency is considered of prime importance, the present course is not meant to be a course of efficient algorithms. Often a method is discussed because of its close relation to (or derivation from) previously introduced concepts. The overriding consideration is to leave the student with as coherent a body of knowledge with regard to graph analysis algorithms, as possible.

In this course are considered some elements of the following main topics:

- Introduction in graph theory (essential concepts and definitions, modeling with graphs and networks, data structures for networks and graphs, computational complexity, heuristics).
- Tree algorithms (spanning tree algorithms, variations of the minimum spanning tree problem, branchings and arborescences).
- Shortest-path algorithms (types of shortest-path problems and algorithms, shortest-paths from a single source, all shortest-path algorithms, the k- shortest-path algorithm, other shortest-paths).
• Maximum-flow algorithms (flow-augmenting paths, maximum-flow algorithm, extensions and modifications, minimum-cost flow algorithms, dynamic flow algorithms).
• Matching and assignment algorithms (introduction and examples, maximum-cardinality matching in a bipartite graph, maximum-cardinality matching in a general graph, maximum-weight matching in a bipartite graph, the assignment problem).
• The chinese postman and related arc routing problems (Euler tours and Hamiltonian tours, the postman problem for undirected graphs, the postman problem for directed graphs).
• The traveling salesman and related vertex routing problems (Hamiltonian tours, basic properties of the traveling salesman problem, lower bounds, optimal solution techniques, heuristic algorithms for the TSP).
• Location problems (classifying location problems, center problems, median problems).
• Project networks (constructing project networks, critical path method, generalized project networks).

Course Aims: Students should obtain basic knowledge and skills for solving optimization problems for graphs and networks.

Teaching Methods: lectures, individual student’s work

Requirements/Prerequisites: Linear Algebra, Linear optimization

Assessment: 3 homework D1,D2,D3; 2 tests K1, K2 (project); written final exam

Rating: $= 0,2 \times (\text{D}_1 + \text{D}_2 + \text{D}_3)/3 + 0,5 \times (\text{K}_1 + \text{K}_2)/2 + 0,3 \times \text{(Exam)}$

Registration for the Course: by request at the end of the current semester

Registration for the Exam: coordinated with the lecturer and Students Service Department

References:

Basic:
1. Ив.Мирчев, "Графи. Оптимизационни алгоритми в мрежи", Благоевград, 2001 г.
2. Ив.Мирчев, "Математическо оптимиране", Благоевград, 2000 г.

Additional:
4. Lih-Hsing Hsu , Cheng-Kuan Lin, Graph Theory and Interconnection Networks. 1420044818, 2008,

SEPARABLE SETS OF VARIABLES OF FUNCTIONS

Semester: 4 semester

Course Type: Lectures and seminars
Hours per week: 2 lecture hours and 1 hour seminar/ Summer Semester
ECTS credits: 4.0 credits
Lecturer: Assoc. Prof. Dimiter St. Kovachev, PhD
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. ++35973588532, e-mail: dkovach@abv.bg
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics
Course Description: The study of behavior of discrete functions when they are substituted by some of their variables by constants, as well as identification of variables, is connected with the development of mathematical cybernetics, automata theory, it is used in the study of recursive functions, in some methods for synthesis of control systems, in the synthesis of contact schemes (the cascade method) and many other parts of the theoretical and applied informatics. In the proposed course, some topics connected with separable sets of variables for the functions are considered, whose applied interpretation in the synthesis of contact schemes and automata make them actual and important. Graphs of functions with respect to separable pairs of their variables are studied. Great attention is paid to strongly essential and c-strongly essential variables for the functions.
Course Aims: Students should obtain basic knowledge in the area of Theory of separable sets of variables for the functions, as well as the ability to apply this theoretical knowledge to Graph Theory in respect to their separable pairs of variables.
Teaching Methods: lectures, exercises, course works and extracurricular occupation.
Requirements/Prerequisites: Preliminary knowledge of Graph Theory and Discrete Functions is useful.
Assessment: Current assessment (four homeworks H1, H2, H3, H4; two control works C1, C2/course works/) and Exam grade.
Final Grade: FG=0.05(H1+H2+H3+H4)+0.2(C1+C2)+0.4(Exam)
Registration for the Course: by request at the end of the previous semester.
Registration for the Exam: coordinated with the lecturer and Student Service Department.
References:
Basic Titles
Additional Titles
7. Shtrakov Sl. and Denecke K., Essential Variables and Separable Sets in Universal Algebra, 2008
VBA PROGRAMMING

Semester: 4 semester
Type of Course: Lectures and tutorials in computer lab.
Hours per week: 1 hour lectures and 2 hours tutorials in computer lab / Summer Semester.
ECTS credits: 4.0 credits
Lecturers: Assoc. Prof. Georgi Tuparov, PhD
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,
tel. +35973588532, e-mail: georgette@swu.bg
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics
Course description: The course is introduction in area of object-oriented and distributed databases. Transaction processing, Data warehousing and Conceptual and semantic approaches of data modeling are considered. A short description of corporative DBMS (Oracle DB) is introduced.
Objectives: The student should obtain knowledge of:
- Design and use of object-oriented and distributed databases.
- Transaction processing.
- Conceptual and semantic approaches of data modeling.
Methods of teaching: lectures, tutorials, discussions, project based method.
Pre-requirements: Database systems (core course)
Assessment and Evaluation
  Project- 30%
  Final Test- 70%
The course is successful completed with at least 65% 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
References
1. Peneva J., Tuparov, G., Databases Part II, Regalia 6, Sofia, 2004
2. Peneva J., Databases Part I, Regalia 6, Sofia, 2004

DEVELOPMENT OF INTERACTIVE MULTIMEDIA EDUCATIONAL CONTENT

Semester: 5 semester
Course Type: lectures, seminars
Hours per week/FS/SS: 2 lecture; 1 seminar exercise / Fall Semester
ECTS credits: 4.5
Lecturers: Assoc. Prof. Daniela Dureva
**Department:** Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: ddureva@swu.bg

**Course Status:** Optional course in the B.S. Curriculum of Mathematics and Informatics

**Course Description:** The course covers topics in area of development of interactive multimedia educational content with MS Power Point and Visual Basic for Application (VBA).

**Objectives:**
- The student should obtain knowledge and skills to:
  - Design of interactive multimedia for educational purpose.
  - Develop interactive multimedia content.

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

**Pre - requirements:** Information technology

**Assessment and Evaluation**
- Semester’s grading - 60%, includes grading of project
- Final Test- 40%

**The course is successful completed with at least 53% 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 Student Service Department

**References:**
2. Иванов И. Интерактивни презентации, Нова Звезда 2011

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**OPERATIONAL RESEARCH**

**Semester:** 5 semester

**Course Type:** lectures, seminars

**Hours per week/FS/SS:** 2 lecture; 1 seminar exercise / Fall Semester

**ECTS credits:** 4,5

**Lecturer:** Prof. Peter Milanov, PhD

**Department:** Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: milanov@swu.bg

**Course Status:** Optional course in the B.S. Curriculum of Mathematics and Informatics

**Course Description:** The aim of the research operation is quantitative analysis and finds a solution by management system.

**Course Aims:** Students should obtain knowledge and skills to find the optimal solution in the analyzing problem.

**Teaching Methods:** lectures, demonstrations and work on project

**Requirements/Prerequisites:** Linear algebra, Computer languages, optimization theory.

**Assessment:** course project

**Registration for the Course:** by request at the end of the current semester

**Registration for the Exam:** coordinated with the lecturer and Student Service Department

**References:**
PROGRAMING WITH OBJECT PASCAL AND DELPHI

Semester: 5th semester  
Type of Course: lectures and labs  
Hours per week: 2 lectures + 2 labs per week / Fall Semester  
ECTS credits: 4.5 credits  
Lecturers: Assoc. Prof. PhD Krasimir Yankov Yordzhev  
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: yordzhev@swu.bg  
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.  
Course description: In the course students are introduced with methods and means of Object-oriented programing in integrated development interface for visual programing - Delphi. The students should have a basic knowledge on programming with Pascal. Suppose that students are successablity passed courses in Programming and Data structures and Object-oriented programming (in SWU this courses are basic on program language C++) and students are known for fundamental skills in programming. In the course students develop programs using different platform and language - Object Pascal and Dlephi.  
Objectives: Basic objectives and tasks:  
- The students give knowledge for algorithm thinking;  
- to give knowledge for Data stuctures, that can process with computer;  
- to give knowledge for methods and skils in Object-oriented programing in integrated development environment for visual programming;  
- to give knowledge for syntax of another program language (Object Pascal and Delphi);  
- to give knowledge for good style in programming;  
- to give knowledge for basic principles when develop applications.  
Methods of teaching: lectures and labs  
Pre-requisites: Basic knowledge in "Programming and Data structures".  
Exam: two course projects and final exam  
Registration for the Course: A request is made by students at the end of the current semester  
Registration for the Exam: Coordinated with the lecturer and the Student Service Office  
References:  
2. Христо Крушков Програмиране с Delphi. Пловдив, „Макрос“, 2004.  
MATHEMATICAL STRUCTURES

Semester: 5-th semester
Course Type: Lectures and tutorials
Hours per week: 2 lecture hours and 1 tutorial hours / Fall Semester
ECTS credits: 4,5 credits
Lecturers: Associate Professor Visil Grozdanov, Ph.D.
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: vassgroz@swu.bg
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.
Short Description: The subject education includes the study of basic number system and the basic algebraic theorem.
Course Aims: The students obtain knowledge and skills in the already mentioned themes and learn how to use them in their future educational practice.
Teaching Methods: lectures, tutorials, homework, and problem solving tests.
Requirements/Prerequisites: The students should have basics knowledge from High algebra, Number theory and Mathematical analysis.
Assessment: permanent control during the semester including homework and two written exams, and written exam in the semester’s end on topics from tutorials and on topics from lectures.
Registration for the Course: by request at the end of the current semester
Registration for the exam: coordinated with the lecturer and student Service Department
References:

DESCRIPTIVE GEOMETRY

Semester: 5 semester
Course Type: Lectures and tutorials
Hours per week: 2 lecture hours and 1 tutorial hour /Fall Semester
ECTS credits: 4,5 credits
Lecturer: Prof. Dr. Adrijan Borisov
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: adribor@swu.bg

Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.

Short Description: The course includes studying of basic topics in classical Descriptive Geometry: Monge’s method, acsonometry and perspective.

Course Aims: The students should assimilate and enlarge their knowledge in Stereometry and to developed their space imagination.

Teaching Methods: lectures, tutorials, homeworks, problem solving tests.

Requirements/Prerequisites: Stereometry, High School Mathematics

Assessment: written exam on topics from tutorials and on topics from lectures.

Registration for the Course: by request at the end of the current semester

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

References:

Basic Titles

Additional Titles

FUNDAMENTALS OF ARITHMETIC

Semester: 5-th semester
Course Type: Lectures and tutorials
Hours per week: 2 lecture hours and 1 tutorial hours / Fall Semester
ECTS credits: 4,5 credits
Lecturer: Assist. Prof. Dr. Ilinka Dimitrova

Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. ++35973588532, e-mail: ilinka_dimitrova@swu.bg

Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.

Short Description: The optional course in Fundamentals of the Arithmetic has the objective to make the students familiar with the notation of “number” and connected with it operations and ordinance relation. The course comprises the natural numbers, the integer numbers, the rational numbers, and the real numbers and in particular cases the complex numbers. The course start with the definition of the notation “finite set” and the notation “induction set”, which was introduced in the beginning of the 20-th century by B. Russell. The course pays attention to the notation natural number; to the operations addition and multiplication of two natural numbers; to the laws that they satisfy; to the inequality between two natural numbers. The students should learn to pass from a decimal system to an arbitrary system. The course continuing with extensions of the semiring of the natural numbers to the ring of the integer numbers, also to the semifield of the fractions and their ordinances. The course finishes with the consideration of the real and the complex numbers.
Course Aims: Students should obtain knowledge and skills for the recent theoretical ideas and the whole scholar course of education in Algebra.

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

Requirements/Prerequisites: The students should have basics knowledge from Number theory and High algebra.

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

Registration for the Course: by request at the end of the current semester

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

References:

Basic Titles

Additional Titles

GEOMETRY OF THE CIRCLES

Semester: 7 semester
Course Type: Lectures and tutorials
Hours per week: 2 lecture hours and 1 tutorial hour /Fall Semester
ECTS credits: 5.0 credits
Lecturer: Prof. Dr. Adrian Borisov
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: adribor@swu.bg
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.
Short Description: The course includes studying of the bundle of circles and some transformations of the circles.

Course Aims: Students should obtain knowledge for the circles.

Teaching Methods: lectures, tutorials, homeworks, problem solving tests.

Requirements/Prerequisites: School course of Geometry.

Assessment: written exam on topics from tutorials and on topics from lectures.

Registration for the Course: by request at the end of the current semester

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

References:

Basic Titles
Additional Titles

FUNDAMENTALS OF GEOMETRY

**Semester:** 7 semester  
**Course Type:** Lectures and tutorials  
**Hours per week:** 2 lecture hours and 1 tutorial hour /Fall Semester  
**ECTS credits:** 5.0 credits  
**Lecturer:** Prof. Dr. Adrian Borisov  
**Department:** Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: adribor@swu.bg  
**Course Status:** Optional course in the B.S. Curriculum of Mathematics and Informatics.  
**Short Description:** The course includes studying of the following basic topics: Hilbert’s axiomatic, Kolmogorov’s metric axiomatic and Well’s axiomatic of the Euclidean Geometry and their equivalence is proved.  
**Course Aims:** Students should obtain knowledge and skills about rigorous construct of a mathematical discipline.  
**Teaching Methods:** lectures, tutorials, homeworks and tests.  
**Requirements/Prerequisites:** High School Mathematics  
**Assessment:** written exam on topics from tutorials and on topics from lectures.  
**Registration for the Course:** by request at the end of the current semester  
**Registration for the Exam:** coordinated with lecturer and Student Service Department  
**References:**  
Basic Titles  

Additional Titles  

METHODS OF EXTRA-CURRICULAR WORK IN MATHEMATICS

**Semester:** 7 semester  
**Course Type:** Lectures and tutorials  
**Hours per week:** 2 lecture hours and 1 tutorial hour /Fall Semester  
**ECTS credits:** 5.0 credits  
**Lecturer:** Prof. DSc. Oleg Mushkarov
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.
Short Description: Main topics:
- Bulgarian and International mathematical olympiads
- Geometric problems on maxima and minima
- Algebraic inequalities
- Employing algebraic inequalities
- Employing geometric transformations
- Selected types of geometric problems on maxima and minima
- Complex numbers
Course Aims: To develop the basic principles of teaching extracurricular topics in mathematics for high school students by using various methods for solving geometric problems on maxima and minima.
Requirements/Prerequisites: Basic knowledge of the high school courses of Algebra and Geometry.
Assessment: Written exam on problem solving and on the theoretical material from the lectures and project developed by the student.
Registration for the Course: by request at the end of the current semester
Registration for the exam: Students and the lecturer agree on the convenient dates within the announced calendar schedule of examination session.
References:
Basic Titles
2. I. Tonov, Applications of complex numbers in geometry Narodna Prosveta, Sofia, 1988
Additional Titles
1. L. Davidov, V. Petkov, I. Tonov, V. Chukanov, Mathematical competitions Narodna Prosveta, Sofia, 1977

FUNDAMENTALS OF COMPUTER GRAPHICS

Semester: 7 semester
Course Type: Lectures and tutorials
Hours per week: 2 lecture hours and 1 tutorial hours /Summer Semester
ECTS credits: 5.0 credits
Lecturer: Prof. Dr. Adrijan Borisov
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.

Short Description: The program a syllabus contains an extension of the subjects:
1. Linear transformations – collineations, affinities, similitudes, identities and their classifications in the plane and in the space.
2. Fundamental methods of representation of the space on the plane – axonometry and perspective.

Course Aims: The students have to obtain knowledge and skills for an application of the transformations in the computer programs of the computer graph.

Teaching Methods: Lectures, tutorials, home works, problem solving tests.

Requirements/ Prerequisites: Analitic Geometry, Linear Algebra and School course of Geometry.

Assessment: Written exam on topics from tutorials and on topics from lectures.

Registration for the Course: by request at the end of the current semester
Registration for the Exam: coordinated with the lecturer and Student Service Department.

References:
Basic Titles

Additional Titles:

EXPERT SYSTEMS

Semester: 7 semester
Type of Course: lectures and tutorials in computer lab
Hours per week: 2 hours lecture and 1 hour tutorials in computer lab/ Fall Semester
ECTS credits: 5,0 credits
Lecturers: Assoc. Prof. Georgi Tuparov, PhD
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad,
tel. +35973588532, e-mail: georgette@swu.bg

Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.

Course description: The course is introduction in area of expert systems.

Objectives:
- The student should obtain knowledge of:
  - Expert systems

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

Pre- requirements: Functional and Logical Programming, Artificial Intelligence (core courses)

Assessment and Evaluation
- Tutorials- 20%
- Final Test- 80%

The course is successful 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  
**References:**  

**OBJECT-ORIENTED AND DISTRIBUTED DATABASES**

**Semester:** 7 semester  
**Type of Course:** lectures and tutorials in computer lab  
**Hours per week:** 2 hours lecture and 1 hour tutorials in computer lab/ Fall Semester  
**ECTS credits:** 5.0 credits  
**Lecturers:** Assoc. Prof. Georgi Tuparov, PhD  
**Department:** Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: georgette@swu.bg  
**Course Status:** Optional course in the B.S. Curriculum of Mathematics and Informatics.  
**Course description:** The course is introduction in area of object-oriented and distributed databases. Transaction processing, Data warehousing and Conceptual and semantic approaches of data modeling are considered. A short description of corporative DBMS (Oracle DB) is introduced.  
**Objectives:** The student should obtain knowledge of:  
- Design and use of object-oriented and distributed databases.  
- Transaction processing.  
- Conceptual and semantic approaches of data modeling.  
**Methods of teaching:** lectures, tutorials, discussions, project based method.  
**Pre-requirements:** Database systems (core course)  
**Assessment and Evaluation**  
- Project- 30%  
- Final Test- 70%  
**The course is successful completed with at least 65% 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  
**References:**  
1. Peneva J., Tuparov, G., Databases Part II, Regalia 6, Sofia, 2004 (in Bulgarian)  

**APPLIED STATISTIC**

**Semester:** 7 semester  
**Type of Course:** seminars and tutorials in computer lab  
**Hours per week:** 2 hours lectures and 1 hour tutorials in computer lab /Fall Semester
ECTS credits: 5.0 credits
Lecturers: Assoc. Prof. Elena Karashtranova, PhD
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: helen@swu.bg

Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.
Course description: The course is introduction in nonparametric statistic and possibility to apply new IT in this area.
Objectives: The students should obtain knowledge of:
- To apply the methods of nonparametric statistics in practice
- To realize concrete applications with tools of IT.

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

Pre-requirements: Probability and Statistics, Information Technology

Assessment and Evaluation
- Project- 30%
- Final Test- 70%

The course is successful completed with at least 65% 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

References:
Basic Titles
1. Карашранова Е. Интерактивно обучение по вероятности и статистика, ЮЗУ, 2010
2. Калинов К.,Статистически методи в поведенческите и социалните науки, НБУ, 2010

Additional Titles:
2. Мадгерова Р., В. Кюрова, Статистика в туризма, ЮЗУ, 2009.

COMPUTER NETWORKS AND COMMUNICATIONS

Semester: 7 semester
Type of Course: seminars and tutorials in computer lab
Hours per week: 2 hours lectures and 1 hour tutorials in computer lab /Fall Semester
ECTS credits: 5.0 credits
Lecturers: Assoc. Prof. Valentin Hristov, Ph.D
Department: Department of Computer Systems and Technology, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad.

Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.
Course description: The course discusses the problems concerning design, building and application of computer networks. The lectures begin with introduction to computer networks, principles of building, historical development and their contemporary classification. Open system interconnection model of ISO is presented. Teaching course
includes basic principles of building and functioning of Local Area Networks (LAN) illustrated by practical technical solutions in LAN Ethernet. The lectures on the most popular in the world computer network Internet present its basic characteristics, principles of functioning and application. The laboratory work helps to better rationalization of lecture material and contribute to formation of practical skills.

Course Aims: The aim of the course is to acquaint students with the basic principles, standards and tendencies of development in the field of computer networks. This will help them in future to professionally solve system tasks in the area of network communications.

Methods of teaching: Lectures (with slides, multimedia projector) and additional text materials; laboratory work (based on instructions) with a tutorial for every laboratory theme.

Pre-requirements: Basic knowledge in informatics.

Assessment and Evaluation: written exam.

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

References:

Basic Titles
1. Христов В. Киров Н.,“Основи на компютърните мрежи и интернет”, ЮЗУ “Н.Рилски” –Благоевград, 2012
2. Христов В. и Стоилов А., „Ръководство за лабораторни упражнения по компютърни мрежи”, ЮЗУ “Н.Рилски” –Благоевград, 2007
5. Илиев Г., Д. Атамян , Мрежи за данни и интернет комуникации. София, Нови Знания, 2009 г.
6. Летников А.И., Наумов В. А. Разработка модели для анализа показателей качества функционирования сигнализации по протоколу SIP, жур. Электросвязь №7, 2007 г., с. 44–47.

INTERNET PROGRAMMING

Semester: 7 semester
Type of Course: Lectures and tutorials in computer lab.
Hours per week: 2 hours lectures and 1 hour tutorials in computer lab / Fall Semester.
ECTS credits: 5.0 credits
Lecturers: Assoc. Prof. Georgi Tuparov, PhD
Department: Department of Informatics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: georgette@swu.bg
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.
Course description: The course is introduction in design and programming of Internet/Intranet Web-based information systems. Combination of JavaScript, CSS and MySQL/PHP/Apache technologies is considered in practical aspects.
Objectives: The student should obtain knowledge of:
• Design and programming of Internet/Intranet Web-based information systems.
• Practical aspects of JavaScript, CSS and MySQL/PHP/Apache technologies.

Methods of teaching: lectures, tutorials, discussions, project based method.
Pre - requirements: Database systems (core course), Web-design practicum.

Assessment and Evaluation
  Project- 30%
  Final Test- 70%

The course is successful completed with at least 65% 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

References:
  5. Allen, J., Homberger, Ch., Mastering PHP 4.1, Sybex, 2002

PROBLEM SOLVING PRACTICUM FOR SCHOOL COURSE IN MATHEMATICS

Semester: 8 semester
Course Type: seminars
Hours per Week: 3 seminar hours / Summer Semester
ECTS Credits: 3,0 credits
Lecturers: Assistant Professor Mariana Kacarska
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: mariana@swu.bg
Course Status: Optional course in Mathematics and Informatics B.C. Curriculum.
Course Description: The course includes: solving problems from corresponding topics of the school curriculum in mathematics; analyzing and generalizing of the solution methods, using students’ knowledge in methodology and the courses: School course in algebra and analysis and School course in geometry.
Course Aims: Course is aiming to acquaint students with the nature of mathematical problems in School course in mathematics. Moreover in the course are clarified the aims that school be pursued, when mathematical problems are solved. The course helps students to systematize and assimilate their knowledge in methodology and in this way they get profound preparation for their future profession; the students develop problem solving skills in School course in mathematics, using knowledge of different age groups.
Methods of teaching: seminars, tutorials, assignments, projects, tests.
Pre-requirements: Some knowledge in Methodology of teaching mathematics and School course in Mathematics 5 – 12 grade /specialized preparation 8 – 12 grade/, are necessary.
Assessment and Evaluation: It is realized by controlling the attendance of seminar exercise, 2 problem-solving tests and elaborates a project presentation. Problem-solving tests are holding on as it follows: first – on modulus 1, 2 and 3; second – on modulus 4 and 5. Project
presentation is students’ elaboration on given topic from School course in mathematics – without any reference to restrictions and with maximum comprehension.

Examination and assessment of students’ knowledge is formed of two problem-solving tests (first – on modulus 1 and 3, second – on modulus 4 and 5) and defence of a project presentation. Each problem-solving test is assessed with 20 points, and defense of project presentation – with 15 points.

Registration for the Course: by request at the end of the current semester
Registration for the Exam: coordinated with lecturer and Student Service Office

References:

Basic Titles:

Additional Titles:

COMPARATIVE EDUCATION /INTEGRATIVE ASPECTS/

Semester: 8 semester
Course Type: lectures
Hours per Week: 3 lecture hours / Summer Semester
ECTS Credits: 3,0 credits
Lecturers: Assoc. Professor Galina Taseva, Ph.D
Department: Philosophy and Political Science, telephone: (073) 8889112
Course Status: Optional course in Mathematics and Informatics B.C. Curriculum.

Short Description: The course includes studying of the following basic topics: The course includes studying of the following basic topics: It focuses on financing the higher education, the quality of high school graduates and their selection, and the measures which the government takes in order to restructure the higher education in conformity with the qualitative changes in society, the economic, social and political challenges which the country faces today.

Course Aims: Students should obtain knowledge about Comparative Education and National Systems of Education.
Teaching Methods: lectures, homeworks and tests.
Requirements/Prerequisites: General Education
Assessment: written exam on topics from lectures.
Registration for the Course: by request at the end of the current semester
Registration for the Exam: coordinated with lecturer and Student Service Department

References:
Basic Titles:
3. Динков, Д., България в европейската интеграция. Изд. Къща „96 плюс”, С., 2002
4. Бижков, Г., Н. Попов. Сравнително образование. ІІ изд. Университетско издавatelство “Св. Кл. Охридски”, С., 1999
5. Бяла книга за българското образование и наука. МОНТ, С., 1992.
8. Попов, Н. Сравнение на структурите на системите на висше образование в 20 европейски страни. Стратегии на научната и образователната политика, 1996, кн.4, 80-87

Additional Titles:
1. Програмите на Европейския съюз. Опит и поуки, „Европейски център за обучение Лактеа”, С., 2005
2. Шрьотер Х., Європа. Актуален справочник, „Рива”, 2002
7. Organisation for Economic Cooperation and Development (OECD):
   http://www.oecd.org/els/stats/edu
8. Statistical Office of the European Communities (EUROSTAT):
   http://europa.eu.int/en/comm/eurostat
11. UNESCO: http://unesco.org/webworld/com
    http://www.nces.ed.gov
HISTORY OF MATHEMATICS

Semester: 8th semester
Type of Course: lectures
Hours per Week: 3 lecture hours / Summer Semester
ECTS Credits: 3.0 credits
Lecturers: Assoc. professor Kostadin Samardjiev, PhD
Department: Department of Mathematics, Faculty of Mathematics and Natural Sciences, South-West University “Neofit Rilski” – Blagoevgrad, tel. +35973588532, e-mail: k_samardzhiiev@abv.bg
Course Status: Optional course in the B.S. Curriculum of Mathematics and Informatics.
Course Description: It includes basic steps of the development of mathematical knowledge until the end of 19th century.
Objectives: basic steps of the development of mathematical knowledge until the end of 19th century are presented to students and they are given an idea how to use that knowledge in their future work as teachers in mathematics.
Methods of teaching: lectures and consultations.
Pre-requisites: Knowledge from the School course in Mathematic
Assessment and Evaluation: written exam
Registration for the Course: by request at the end of the current semester
Registration for the Exam: coordinated with lecturer and Student Service Office
References:
Basic Titles:
1. Бомарский, Б., Очерки по истории математики, Минск, 1979
2. Ганчев, Ив. История на математиката, 1999
3. Строик, Д. Я. Краткий очерк по истории математики, М. 1988
Additional Titles:
1. Ван дер Ванден, Б. Л. Пробуждающая се наука, С., 1968
2. Денман, И. Я., История Арифметики, М., 1959