

**QUALIFICATION CHARACTERIZATION
OF MAJOR FIELD OF STUDY “ECONOMIC MATHEMATICS”
FOR “MASTER OF SCIENCE” DEGREE
WITH PROFESSIONAL QUALIFICATION “MASTER OF MATHEMATICS”**

Major "Economic mathematics" is of professional field 4.5 Mathematics. Education in a degree „Master” has a regular form and lasts two years (four semesters). **General characteristics of the program:** The students completed this major field of study have specialized knowledge and skills in modern applications of mathematics and mathematical modeling. By incorporating Informatics disciplines, ensure students' knowledge in the field of information systems in the economy. Part of the courses are optional, which allows students to prepare more thoroughly in their desired field of theory and applications of mathematics, and to attend additional courses in mathematics, informatics, economics, insurance and other. The training ends with a state exam or thesis defense, which will allow them to individually solve relevant to mathematics and its application tasks.

Requirements to preparation of students completing this major field of study

Students completed MSc degree in Economic Mathematics have to possess following knowledge, skills and competences:

- Skills to create a mathematical model of a situation to prove mathematical statements and to solve problems with theoretical or applied nature;
- Ability to abstraction, logical development of formal mathematical theories and establishing links between them;
- Ability for mathematical modeling of real world phenomena and describe through mathematical apparatus of the studied processes and phenomena;
- Ability to deal with new tasks from different areas of knowledge;
- Ability to understand problems and derive the general regularities in them;
- Ability to formulate complex problems of optimization, decision making and to interpret the obtained solutions in terms of the context of the problem to be solved;
- Ability to make mathematical arguments and conclusions from them clear, precise and accurate mathematical language, in oral and written form to those for whom it is intended decision of the mathematical problem;
- Knowledge of the process of learning and teaching of mathematics in different levels of training.

Career opportunities: The students completed this Master's program are prepared to apply mathematical formalism and use new technologies in different application areas - banks, insurance companies, the economy and trade, scientific research teams. Graduates of the Master's program "Economic Mathematics" have the opportunity to continuing education at PhD degree. They can work as teachers and researchers in universities and research institutes.

Qualification characterization of Major field of study “Economic Mathematics” for MSc 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: Economic Mathematics, 2015

First Year			
First Semester			
<i>Plan A. For students who have previously completed professional field 3.8. Economics or 3.7 Administration and management (speciality Business Administration)</i>		<i>Plan B. For students who have previously completed professional field 5. Technical sciences or 4.1. Physical Sciences</i>	
Compulsory Courses	ECTS credits	Compulsory Courses	ECTS credits
Selected topics from algebra and geometry	8	Micro and Macroeconomics	9
Mathematical analysis	8	Finance	7
Differential equations	6	Marketing	6
Programming and use of computers	8	Programming and use of computers	8
Second Semester			
Compulsory Courses	ECTS credits	Optional Courses from Group I	ECTS credits
Functional analysis	8	European programs and projects	5
Mathematical optimization	9	Risk management	5
Numerical methods Part I	8	Specialized statistical software	5
Optional Course from Group I	5		
Second Year			
Third Semester			
Compulsory Courses	ECTS credits	Optional Courses from Group II	ECTS credits
Numerical methods Part II	8,5	Finance and financial operations	5
Financial mathematics	8,5	Insurance	5
Operations research	8	Econometrics	5
Optional Course from Group II	5	Technologies, competition and business strategies in the 21st century	5
Fourth Semester			
Compulsory Courses	ECTS credits	Optional Courses from Group III	ECTS credits
Information systems in economics	5	Game theory	5
Stochastic models in economics	5	Monte Carlo Numerical methods	5
Optional Course from Group III	5	Nonlinear dynamics and economics	5
Graduation	15	Time series	5

TOTAL FOR 2 ACADEMIC YEARS: 120 CREDITS

Optional subjects

Students may study in addition as an optional course any course taught in the university, which provides additional training according to their interests regardless of the faculty in which the training is organized

COURSES DESCRIPTION

COMPULSORY COURSES

MATHEMATICAL ANALYSIS

Semester: 1 semester

Course Type: lectures and seminars

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

ECTS Credits: 8.0 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 M.Sc. Curriculum of Economic Mathematics.

Course 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:

- 1.V. A. Ilin, V. A. Sadovnichy, B. H. Sendov, Mathematical Analysis, V. 1 and 2, Sofia, Science and Art, 1989.
2. Ia. Tagamlitzky, Differential Calculation, Sofia, Science and Art, 1971.

3. Ia. Tagamlitzky, Integral Calculation, Sofia, Science and Art, 1971.
4. I. Prodanov, N. Hadjivanov, I. Chobanov, Collection of problems of Differential and Integral Calculation, Sofia, Science and Art, 1976.
5. V. Grozdanov, K. Iordjev, A. Markovska, Guidance for solving of problems of mathematical analysis- first part, “Neophit Rilsky” publishing house, Blagoevgrad, 2012.

SELECTED TOPICS FROM ALGEBRA AND GEOMETRY

Semester: 1 semester

Course Type: lectures and seminars

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

ECTS Credits: 8.0 credits

Lecturers: Associate Professor Ilinka Dimitrova, Ph.D.

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 M.Sc. Curriculum of Economic Mathematics.

Course Description: The course includes the study of some important concepts and ideas from the geometry and theory of semigroups and groups, the theory of rings and fields, algebraic polynomials. The concepts are introduced in the abstract and are supported by many examples.

Course Aims: Acquisition of knowledge and skills for the basic geometric concepts and algebraic structures - semigroups, groups, rings and fields, for the theory of polynomials, as well as the applications of this apparatus for solving some practical problems related to other mathematical and informatics.

Teaching Methods: Lectures, tutorials, homework, problem-solving tests.

Requirements/Prerequisites: Basic knowledge of courses in Linear Algebra, Analytical Geometry and Number Theory is necessary.

Assessment: 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. Денеке, К., К. Тодоров. Основи на алгебрата. Благоевград, ЮЗУ “Неофит Рилски”, 2001.
2. Генов, Г., С. Миховски. Т. Моллов, Алгебра, Университетско издателство „Паисий Хилендарски”, Пловдив, 2006.

3. Михайлов, И., Н. Зяпков. Висша алгебра и теория на Галоа, „Фабер”, Велико Търново, 2004.
4. Сидеров, П., К. Чакърян. Записки по алгебра. „Веди”, София, 2006.
5. Божилов, А., П. Сидеров, К. Чакърян. Задачи по алгебра. „Веди”, София, 2006.
6. Додунеков, С., К. Чакърян. Задачи по теория на числата. Регалия, 1999.
7. Дочев, К., Д. Димитров, В. Чуканов. Ръководство за упражнения по висша алгебра. София, 1976.
8. Курош, А. Курс по висша алгебра. София, “Наука и изкуство”, 1967
- В. А. Илин, В. А. Садовничи, Б. Х. Сендов, Математически анализ, том 1 и том 2, "Наука и изкуство", София, 1989.
9. Мартинов, Н. Аналитична геометрия. София, “Наука и изкуство”, 1989г.
10. Петканчин, Б. Аналитична геометрия. София, “Наука и изкуство”, 1961.

DIFFERENTIAL EQUATIONS

Semester: 1 semester

Course Type: lectures and seminars

Hours per Week: 2 lecture hours and 2 seminars hour / Fall Semester

ECTS Credits: 6.0 credits

Lecturers: Associate Professor Nikolay Kitanov, Ph.D.

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

Course Status: Compulsory course in M.Sc. Curriculum of Economic Mathematics.

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:

1. Differential Equations, 2008, <http://www.sosmath.com/diffeq/diffeq.html> (наш превод - в ЮЗУ -2011 г)
2. Попиванов П., П.Китанов, Обикновени диференциални уравнения. ЮЗУ Благоевград, 2000.
3. Борисов А., Ил.Гюдженев. 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.
5. Живков А., Е. Хорозов, О. Христов <http://debian.fmi.uni-sofia.bg/~horozov/DifferentialEquations/book.pdf> (X.2007- 2008)
6. <http://www.exponenta.ru/educat/class/courses/ode/theme1/theory.asp> 2013.
7. Ordinary Differential Equation <http://www.mat.univie.ac.at/~gerald/ftp/book-ode/ode.pdf>
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. Пушкарров. Д. Математически методи на физиката.Ч. I., 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.
13. Stewart J. Calculus. III ed. (AUBG). 1996.
14. Сп.Манолов, А.Денева и др. Висша математика, част 3. Техника, 1977г.
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)

PROGRAMMING AND USE OF COMPUTERS

Semester: 1 semester

Course Type: lectures and seminars

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

ECTS Credits: 8.0 credits

Lecturers: Assistant Professor Ivo Damianov, Ph.D.

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

Course Status: Compulsory course in M.Sc. Curriculum of Economic Mathematics.

Course Description: The course is an introduction in programming. Course topics include: data representation in computers, algorithms, data types, variables, expressions, arrays, procedures, functions, Object-oriented programming and event-driven programming paradigm are also covered. The course assumes no or little prior knowledge of programming.

Course Aims: The students should obtain basic knowledge and skills in problem solving using structured or object-oriented approaches in programming.

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

Requirements/Prerequisites: This course is introductory course with no prerequisites.

Assessment: written exam (test) on studied material

Registration for the Course: not required

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

References:

1. Schneider D., An Introduction to Programming Using Visual Basic Int. Ed., Prentice Hall, Pearson Education Inc., 9th Ed 2014, (8th Ed 2010)
2. Дамянов И., (2012) Увод в програмирането, УИ "Неофит Рилски", ISBN 978-954-680-830-1, COBISS.BG-ID – 1248729572
3. Conrod, P. & Tylee. L. (2019). Learn Visual Basic 2019 Edition: a step-by-step programming tutorial. S.l.: KIDWARE SOFTWARE.
4. Zak, D., Programming with Microsoft Visual Basic 2012, Course Technology, Cengage Learning, 6th Ed. 2014

MICRO AND MACROECONOMICS

Semester: 1 semester

Course Type: Lectures and seminars

Hours per week: 3 lecture hours and 3 seminar hours / Fall Semester

ECTS credits: 8.0 credits

Lecturer: Assoc. Prof. Dr. Plamen Patchev, PhD

Department: Department of International Economic Relations, Faculty of Economics, South-West University "Neofit Rilski" – Blagoevgrad,
tel. +35973588532, e-mail: plamenp@swu.bg

Course Status: Compulsory course in the M.Sc. Curriculum of Economic Mathematics.

Short Description: The course is designed primarily for the analysis of the main aspects of the theory and practice of democratic market economy type. It clarifies the basic methodological formulations and provides an overview of economic laws, valid for the entire line of business /those having universal significance/. Course contents: Need, purpose, and key aspects of developing and managing projects. Nature and basic characteristics of the financial analysis of projects. Stages and key areas of financial analysis of projects. Basic financial concepts. Time value of money. Compounded and discounted cash flows. Annuities. Criteria and methods of financial analysis and project evaluation. Static methods for financial analysis of projects. Dynamic methods of financial

analysis of projects. Choice between alternative projects. Methods for selecting between two or more projects. Essence of the risk in developing and managing projects. Approaches and methods of analysis and risk assessment.

Course Aims: The aim is to justify the idea that the entire business as a direct or indirect connection with the major issues of supply and demand, "strong" and "weak" pulse of the market on "balance" the efficiency and profitability of implementation of specific planning, reporting mandatory conditions ensuring economic development entities in the long term, etc.

Teaching and assessment: Teaching is in the form of lectures and seminars. At the beginning of each lecture a short introduction is provided to ease the transition from one topic to another. New topics are discussed with students to achieve continuity of training and help students draw their own conclusions.

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

References:

Basic Titles

1. Е. Бояджиева, М. Кьоглер. Основи на икономическата теория. Благоевград 2005.
2. Л. Йотова. Икономикс. Част I и II. Изд. УНСС, София 2008.
3. И. Димов. Обща икономическа теория. Изд. "Абагар". В. Търново 2004.
4. Г. Хартман. Пазарна икономика. Част I и II. Изд. "Булвест-2000", София 2003.
5. Е. Сотирова. Сборник от задачи тестове по макроикономика. УНСС, София 2003.
6. Проф. Стоядин Савов "Икономикс", С. 1996 г. – в два тома.
7. Проф. Камен Миркович, "Икономикс", С. 2001 г.
8. Пламен Пъчев – „Микроикономика” С.-Бл. 2011 г.

Additional Titles

1. Дж. М. Кейнс. Обща теория на заетостта, лихвата и парите. Изд. "Хр. Ботев", София 1994.
2. М. Фридмън. Немирството на парите. Епизоди от монетарната история. ИК "Дамян Яков", София 1994.
3. Р. Рийч. Трудът на нациите. Как да се подготвим за капитализма на ХХI век. Унив. изд. "Св. Климент Охридски", София 1992.
4. Р. Хайлбронер, Л. Търоу. Икономика за всички. Изд. "Интерпринт", София 1993.
5. Учебен речник по икономикс. Том I и II. Изд. "Сиела", София 2003.
6. Проф. Поль Самуэлсон "Економика", М. 1976 г. /Препоръчително е да се ползват учебниците на този автор – самостоятелно или в съвотворство с Нордхаус на съответните западни езици, които студентът владее/
7. Проф. Гернот Хартман "Пазарна икономика", С. 1992 г. – в две части

FINANCE

Semester: 1 semester

Course Type: Lectures and seminars

Hours per week: 3 lecture hours and 1 seminar hour /Fall Semester

ECTS credits: 5.5 credits

Lecturer: Assoc. Prof. Desislava Stoilova, PhD

Department: Department of Finance and accounting, Faculty of Economics, South-West University “Neofit Rilski” – Blagoevgrad

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

Course Status: Compulsory course in the M.Sc. Curriculum of Economic Mathematics.

Short Description: The course is aimed to transmit to the students the basic knowledge about the state fiscal and budget policy. The material includes a reasonable compromise between theoretical and practical information. The course is aimed at letting the students: (i) to consider the particularities of the state finance system; (ii) to acquire new basic knowledge and skills for organizing and managing of the public finances; (iii) to be aware of the methods for planning and regulating in the state fiscal and budget sphere, as well as of the applicable organization structures in this regard; (iv) to apply the existing techniques for generation of innovative and creative ideas in the tax policy; (v) to be able to identify, evaluate and avert and limit the risk that accompany the management of the public finances. Course contents: Money. Public (fiscal) finances. Consolidated State Budget. Budget Processing. Fiscal Decentralization. Taxes. Tax System and Tax Policy. Direct Taxation of the Property. Direct Income Taxation. Indirect Taxation. Excise Duties. Customs Duties and Customs Duty Policy. Value Added Tax. The Non Tax Revenues in the State Budget. Social Insurance. Budget Deficit and its Financing. Tax and Finance Controlling. International Public Finances

Teaching and assessment: Teaching is in the form of lectures. At the beginning of each lecture a short introduction is provided to ease the transition from one topic to another. New topics are discussed with students to achieve continuity of training and help students draw their own conclusions. In training priority is given to practical and independent work by students.

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

References:

Basic Titles

1. Ч. Николов Д. Стоилова Е. Ставрова “Публични финанси” БОН Благоевград 2010
2. Стоянов, В., Финанси, ИК Галик, София, 2008

Additional Titles

1. R.A. Musgrave, P.B. Musgrave, L. Kullmer “Public Finance in Theory and Practice” McGraw-Hill, Inc 1973
2. H. Rosen “Public Finance” Irwin McGraw- Hill 1998

MARKETING

Semester: 2 semester

Course Type: lectures and seminars

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

ECTS Credits: 6.0 credits

Lecturers: Associate Professor Viara Kyurova, Ph.D.

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

Course Status: Compulsory course in M.Sc. Curriculum of Economic Mathematics.

Course Description:

The training process will provide sufficient information about the methods and approaches how to properly solve the problems of production and sales of companies, how to quickly adapt to the needs and changes in the market, why differentiate from potential consumers and more. The program provides for the consideration of key issues concerning the nature, role, means and possibilities of marketing, to further develop the acquired theoretical knowledge in the field of marketing and to give them practical orientation and completeness. Along with the presentation of fundamental knowledge, skills for applying this knowledge in practice are formed. This determines the interdisciplinary nature of teaching and learning and the expected results that the acquired knowledge will support the study of both other disciplines and disciplines with economic and business orientation.

Course Aims: This course aims to meet the need of students for knowledge of economic management methods in a market economy.

Teaching Methods: lectures, tutorials

Requirements/Prerequisites: Not needed.

Exam: written exam

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

References:

1. Желев, С. Младенова, Г. Маркетинг. Университетско издателство „Стопанство“, С., 2012.
2. Alvin J. Silk, What Is Marketing?, Harvard Business School Press, 2006

FUNCTIONAL ANALYSIS

Semester: 2 semester

Course Type: lectures and seminars

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

ECTS Credits: 8.0 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 M.Sc. Curriculum of Economic Mathematics.

Course Description: The course in Functional analysis includes basic concepts of the functional analysis: metric, topological, linear normed, Euclidean and Hilbert spaces. The technique of the Fourier series is considered.

Course Aims: Students should obtain knowledge for Functional Analysis, which is a basic mathematical discipline. This knowledge is necessary for studying, Complex analysis, Ordinary Differential Equations, Numerical Methods, Optimization.

Teaching Methods: lectures and seminars

Requirements/Prerequisites: Mathematical Analysis

Assessment: written final exam, two problems solving tests per semester

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:

1. A. N. Kolmogorov, S. B. Fomin, Elements of the theory of functions and functional analysis, “Science”, Moscow, 1976.
2. A. A. Kirrilov, A. D. Gvashiani, Theorems and problems on functional analysis, “Science”, Moscow, 1979.
3. V. A. Ilin, V. A. Sadovnichii, B. H. Sendov, Mathematical analysis, vol. 1 and 2, “Science and Art”, Sofia, 1989.

MATHEMATICAL OPTIMIZATION

Semester: II semester

Course Type: Lectures and tutorials

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

ECTS credits: 9,0 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 M.Sc. Curriculum of Economic Mathematics.

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 2×2 , $2 \times n$, and $m \times 2$ 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:

1. P. Kenderov, G. Hristov, A. Dontchev – “Mathematical Programming”, Kliment Ohridski Sofia University Press, Sofia, 1989 (in Bulgarian).
2. “Mathematical Programming Problem Book”, Kliment Ohridski Sofia University Press, Sofia, 1989 (in Bulgarian).
3. Stefan M. Stefanov – “Quantitative Methods of Management”, Heron Press, 2003 (in Bulgarian).

Additional Titles:

4. Stefan M. Stefanov – “Separable Programming. Theory and Methods”, Kluwer Academic Publishers, Dordrecht – Boston – London, 2001.
5. Hamdy A. Taha – „Operations Research. An Introduction”, 9-th ed., Prentice Hall, USA, 2010.

NUMERICAL METHODS PART I

Semester: II semester

Course Type: Lectures and labs

Hours per week: 3 lecture hours and 2 labs hours /Summer 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 M.Sc. Curriculum of Economic Mathematics.

Short Description: A detailed study of interpolation as a way to approximate tabular functions is envisaged: classical interpolation problem, Lagrange interpolation formula, interpolation error (formula and error estimate), split differences and Newton's interpolation formula with split differences, finite differences and interpolation formulas with finite differences, interpolation with spline functions (linear and cubic alloys), Hermit interpolation problem, inverse interpolation. Another main approach for approximation of functions is considered - root mean square approximations (least squares method). There is a place for the topics of multiple differentiation and multiple integration - quadrature formulas of Newton-Coates (formulas of rectangle, trapezoid and Simpson) and Gauss. It is planned to study basic methods for multiple elimination of nonlinear equations: chord method, second method, Newton's method. Another important topic is the solution of the system of linear equations, which is reached in many mathematical, physical, technical and others. tasks: exact methods - Gaussian and Gaussian-Jordan methods, triangular decomposition method (LU-method), Holeski method (square root method); interactive methods - simple iteration method (Jacobi method), Seidel method. The study of methods for multiple solution of the Cauchy problem for ordinary differential equations (TAC) of the first order - Euler's method, Runge-Kuta methods, Adams methods; the pure solution of the boundary value problem for ordinary differential equations of order II.

It is planned to get acquainted with software products that implement some of the considered methods.

Course Aims: Students should obtain basic knowledge of the basic numerical methods of mathematical analysis, algebra and differential equations, which are used in solving various technical, physical and other problems.

Teaching Methods: lectures and labs

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

Assessment: written final exam in two parts

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

References:

Basic Titles:

1. Бл. Сендов, В. Попов – “Числени методи”, I част, Университетско издателство “Св. Климент Охридски”, София, 1996; II част, “Наука и изкуство”, 1978.
2. Б. Боянов – “Лекции по числени методи”, София, 1995.
3. Колектив – “Сборник от задачи по числени методи”, 2-ро изд., Университетско издателство “Св. Климент Охридски”, София, 1994.
4. М. Касчиев – “Ръководство по числени методи”, изд. “Мартилен”, София, 1994.
5. R. L. Burden, J. D. Faires – “Numerical Analysis”, 9-th ed., Cengage Learning, Stamford, CT, USA, 2010.
6. J. D. Faires, R. L. Burden – “Numerical Methods”, Brooks/Cole Publishing Company, Pacific Grove, CA, USA, 2002.

7. S.M. Stefanov – “Numerical Analysis”, MS4004-2203, Limerick, 1998. P. Kenderov, G. Hristov, A. Dontchev – “Mathematical Programming”, Kliment Ohridski Sofia University Press, Sofia, 1989 (in Bulgarian).

NUMERICAL METHODS PART II

Semester: III semester

Course Type: Lectures and labs

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

ECTS credits: 8,5 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 M.Sc. Curriculum of Economic Mathematics.

Short Description: The course includes the study of the basics of uniform approximations (Chebyshev's theory of alternation, uniform approximations with linear positive operators), variational methods for solving operator equations (in particular the boundary value problem for ordinary differential equations of order II), network methods for solving of partial differential equations (elliptical, hyperbolic and parabolic), as well as basic methods for solving integral equations - Voltaire's and Fredholm's equations of the second kind (method of mechanical squaring, method of degenerate nuclei, method of successive approximations / of resolvents)).

Course Aims: Students should obtain basic knowledge of uniform approximations, variational methods for solving operator equations, basic numerical methods for solving partial differential equations, and theory and methods for solving integral equations, which are used in solving various problems.

Teaching Methods: lectures and labs

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

Assessment: written final exam in two parts

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

References:

Basic Titles:

1. Бл. Сендов, В. Попов – “Числени методи”, I част, Университетско издателство “Св. Климент Охридски”, София, 1996; II част, “Наука и изкуство”, 1978.

2. Б. Боянов – “Лекции по числени методи”, София, 1995.
3. Колектив – “Сборник от задачи по числени методи”, 2-ро изд., Университетско издателство “Св. Климент Охридски”, София, 1994.
4. М. Касчиев – “Ръководство по числени методи”, изд. “Мартилен”, София, 1994.
5. R. L. Burden, J. D. Faires – “Numerical Analysis”, 9-th ed., Cengage Learning, Stamford, CT, USA, 2010.
6. J. D. Faires, R. L. Burden – “Numerical Methods”, Brooks/Cole Publishing Company, Pacific Grove, CA, USA, 2002.
7. S.M. Stefanov – “Numerical Analysis”, MS4004-2203, Limerick, 1998. P. Kenderov, G. Hristov, A. Dontchev – “Mathematical Programming”, Kliment Ohridski Sofia University Press, Sofia, 1989 (in Bulgarian).

FINANCIAL MATHEMATICS

Semester: 1 semester

Course Type: lectures and seminars

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

ECTS Credits: 6.0 credits

Lecturers: Associate Professor Michail Kolev, Ph.D.

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

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

Course Status: Compulsory course in M. Sc. Curriculum of Economic Mathematics.

Course Description:

The subject includes the study of basic concepts of financial mathematics, financial calculations which are used in the process of banking practice. Students are also introduced to the basics of statistical databases and obtain information about patterns and trends that may occur, their utility in the evaluation and decision-making in certain activities in the bank sector. Purposefully, emphasis is put on the instrumentation and the application of statistical methods that emerge in different banks, namely: addition, organization and presentation of statistical data, presentation of statistics, descriptive statistics, variance, correlation, indexing, and analysis of time series. Practical application methods related to the use of different quantitative methods in economics are treated – types of interests, calculation features of discount operations and techniques of discounted cash flows, preparation of repayment plans and methods that calculate the profitability of financial instruments .

Course Aims:

The subject “Financial Mathematics” aims to offer a thorough and detailed understanding of the concepts, principles, approaches and techniques in financial calculations.

Teaching Methods: lectures and seminars

Requirements/Prerequisites: Mathematical Analysis I

Assessment: written final exam, two problems solving tests per semester

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

References:

1. Мейсън, А., Браун, Л., Петров, С., Финансова математика, МБИ, София, 2012, г.
2. Дочев, Д., Николаев, Р., Петков, Й., Финансова математика, Варна, Унив. Издат. Наука и икономика, 2010, ISBN: 978 954 21 0499 5.
3. Цончев, Р., Финансови изчисления, НБУ.
4. Йовков, Й. Петков, В., Финансова математика, „Нова звезда”, София, 2001, ISBN: 954 8981 32 7.
5. Van Horn, J., Vachowicz Jr., Fundaments of Financial Menagement, Prentice Hall, Upper Saddle River, New Jersy 07458, 2001.

OPERATIONS RESEARCH

Semester: 1 semester

Course Type: lectures and tutorials

Hours per Week: 2 lecture hours and 2 lab hour per week/Fall Semester

ECTS Credits: 5.5 credits

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 M. Sc. Curriculum of Economic Mathematics.

Course Description: The course in Operations Research includes the following main topics: basic concepts in Operations Research; deterministic models, models with uncertainty and stochastic models, especially the facility location (production planning) problem in deterministic and stochastic version; stochastic programming and stochastic quasigradient methods; dynamic programming and Bellman’s principle of optimality; the concept of algorithm, algorithmic (computational) complexity and NP-hard problems; discrete (including integer) optimization problems and network optimization; scheduling theory; queueing theory; game models, matrix game theory and the relationship between matrix game theory and linear programming; decision making theory; fuzzy sets and their application to decision making and management; multi-objective (vector) optimization and Pareto optimality; Marcov processes (discrete and continuous); the concept of Monte-Carlo methods and their applications. Software for solving some of the problems under consideration will also be demonstrated.

Course Objectives: Students should obtain knowledge about basic results and methods for studying various real objects, events, phenomena, etc. by using mathematical methods and computes.

Teaching Methods: lectures and tutorials

Requirements/Prerequisites: Numerical Analysis, Mathematical Optimization

Assessment: written final exam on two theoretical topics (grade weight is 60 %); two projects (grade weight is 40 %).

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

References:

1. E. S. Vencel – „Operations Research: Problems, Principles, Methodology“, 2-nd ed., Nauka, Moscow, 1988 (in Russian).
2. Yu. P. Zaichenko – “Operations Research”, Visshta Shkola, Kiev, 1988 (in Russian).
3. S. M. Stefanov – “Quantitative Methods of Management”, Heron Press, Sofia, 2003 (in Bulgarian).
4. Hamdy A. Taha – „Operations Research. An Introduction“, 9-th ed., Prentice Hall, USA, 2010.
5. S. M. Stefanov – “Separable Programming. Theory and Methods”, Kluwer Academic Publishers, Dordrecht–Boston–London, 2001.

INFORMATION SYSTEMS IN ECONOMICS

Semester: 2 semester

Course type: Lectures and tutorials in computer lab

Hours per Week: 1 lecture hour and 3 lab hour per week / Summer Semester

ECTS Credits: 5.0 credits

Lecturer: Assoc. Prof. Ivan Trenchev, Ph D

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

Course status: Compulsory Course in M. Sc. Curriculum of Economic Mathematics

Course description: The main included topics are: Information society. Abstract models of computers. Programming technology. Hardware and software. Operation systems. Word processing. Table-processing – MS-EXCEL. Computer networks. HTML and XML documents. E-mail, web-browsing, FTP.

Course aims: Non-trivial introduction in basic information systems and technologies used in economics.

Teaching methods: lectures, seminars, group discussions or workshop, projects, other methods

Requirements/ Prerequisites: Basic knowledge in Computer science.

Materials: Textbook and manual of the course are published; 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 exam: in the department office, co-ordinated with the lecturer.

Literature:

1. Пламенка Боровска, Компютърни системи, Сиела, 2009.
2. Ангел Ангелов, Учебна среда за обучение по електронни таблици, София, 2012.
3. Марсел Гание, Преминаване към Linux + CD, СофтПрес, 2010.
4. Windows Vista - в лесни стъпки, СофтПрес, 2010.
5. Венцислав Джамбазов, Уеб базирани потребителски интерфейси, НБУ, 2011.
6. Георги Илиев, Димитър Атамян, Мрежи за данни и интернет комуникации, Нови знания, 2009.
7. Денис Колисниченко, HTML 5 & CSS 3 - практическо програмиране за начинаещи, Асеновци, 2012.
8. Анета Зашева, Информационни системи - Приложение в оперативното управление, София, 2012.

STOCHASTIC MODELS IN ECONOMICS

Semester: 2 semester

Course type: Lectures and tutorials in computer lab

Hours per Week: 2 lecture hours and 2 lab hour per week / Summer 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: Compulsory Course in M. Sc. Curriculum of Economic Mathematics

Short Description: The main topics to be considered:

- basic economic tasks that require stochastic modeling;
- construction of stochastic models of real problems of economy and analyzing them;
- practical ability to construct stochastic models and etc.

Course Aims: The aim of the studied subject is to give students theoretical knowledge and practical experience in the construction of stochastic models in the economy.

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:

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. Аласдър Смит. Математическо въведение в икономиката. Изд. „Кл. Охридски” 2000
2. Oksendal B., Stochastic Differential Equations, 6th edition, Springer, 2003.
3. Ross S.M., Introduction to Probability Models, 10th edition, Academic Press, 2010.
4. Божкова М., Случайни процеси, 2012

Additional Titles:

1. Grimmett G., Stirzaker D., Probability and Random Processes, 3rd edition, Oxford University Press, 2001.
2. Димитров Б., Янев Н., Вероятности и статистика, Университетско издателство ”Св. Климент Охридски”, 2002.
3. Стоянов Й., Стохастични процеси – теория и приложение, Наука и изкуство, 1978

OPTIONAL COURSES

RISK MANAGEMENT

Semester: 2 semester

Course Type: lectures and seminars

Hours per Week: 2 lecture hours + 2 seminars per week/Fall Semester

ECTS Credits: 5.0 credits

Lecturer: Assistant Prof. Vladimir Tsenkov, PhD

Department: Department of Finance and accounting, Faculty of Economics, South-West University “Neofit Rilski” – Blagoevgrad, e-mail: v.tsenkov@swu.bg

Course Status: Optional course in M. Sc. Curriculum of Economic Mathematics

Course Description: The aim of the course is to satisfy the need of students for knowledge about risk and uncertainty in information society and about the behavior organizations require. Enough information will be provided on how to properly formulate problems, efficiently discuss them and jointly resolve them under dynamic changes and uncertainty. The course is tailored to match the course hours and help the students become familiar with theory and practice of effective business decision making.

Course contents: Theory of decision making under risk and uncertainty. Risks in business decisions. Mainstreams of business decision theory. General characteristics of the business decision efficiency tools under risk and uncertainty. Principles and practice of business decisions under risk and uncertainty. Business decisions and the organization management system under risk and uncertainty. Personal and situation factors in business decisions. Techniques for the preparation of business decisions. Techniques for the choice, implementation and control of business decisions. Challenges to business decisions in the «Organizations of knowledge». “The economic behaviorism” and collective decision making phenomena. The games as a business decision making procedure. Role and scenario games.

Teaching and assessment: Training course takes the form of lectures and seminars. The course ends with an exam. Priority in training is practical and independent work of students. Assessed are the knowledge, skills and competence during seminars in the course of the current control, of serious importance are the results achieved by the set assignments and tests.

Registration for the Course: by request at the end of the previous academic year

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

References:

1. Габровски, Р. и др., „Корпоративен риск мениджмънт”, Свищов, 2004;
2. Георгиев, Р., "Управлението на риска и застраховането", учебно помагало http://www.rgeorgiev.com/p/blog-page_2744.html, 2010;
3. Василев, В., „Рисково-базиран надзор върху работата на неживото-застрахователните дружества в България”, изд. „Фабер”, 2010;
4. Наредба за реда и методиката за образуване на застрахователните резерви;
5. Застрахователен кодекс;

SPECIALIZED STATISTICAL SOFTWARE

Semester: II semester

Type of Course: Lectures, seminars

Hours per week: 2 hour lectures, 2 hour seminars /Summer 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 M. Sc. Curriculum of Economic Mathematics.

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
3. П. Копанов, В. Нончева, С. Христова, Вероятности и статистика, ръководство за решаване на задачи, Университетско издателство „Паисий Хилендарски”, 2012, ISBN 978-954-423-796-7
4. G.Freiman, Exploratory data analysis, J., Isr.Math, 2002

Additional Titles:

1. <http://www.teststat.hit.bg>
2. Мадгерова Р., В. Кюрова, Статистика в туризма, ЮЗУ, 2009.

FINANCE AND FINANCIAL OPERATIONS

Semester: 1 semester

Course Type: lectures

Hours per Week: 2 lecture hours per week/Fall Semester

ECTS Credits: 5.0 credits

Lecturer: Prof. Gancho Ganchev, PhD

Department: Department of Finance and accounting, Faculty of Economics, South-West University “Neofit Rilski” – Blagoevgrad, e-mail: ganchev@swu.bg

Course Status: Optional course in M. Sc. Curriculum of Economic Mathematics

Course Description: The course "Finance and financial operations" aims to introduce students to the theory of capital markets, as well as the most important institutional fundamentals of stock trading and stock exchange transactions.

The material is selected in accordance with the prescribed workload and specifics of the course and within a reasonable compromise between the theoretical and empirical material gives priority to

the relationship between economic theory and actual market behavior of investors, issuers and other market agents. To this end, consider some topics that are not included in the curriculum in securities and financial markets of other economic subjects.

Discipline is one of the main subjects in the training of specialists with higher economic education of all specialties. It specifies a number of theoretical issues related to micro and macroeconomics, while giving practical knowledge necessary for successful work in a competitive market environment

Course Aims: The aim of the course is to give students the necessary theoretical knowledge for correct interpretation of the economic behavior of investors, issuers, speculators, brokers and financial supervisory authorities.

Teaching and assessment: Teaching is in the form of lectures. At the beginning of each lecture a short introduction is provided to ease the transition from one topic to another. New topics are discussed with students to achieve continuity of training and help students draw their own conclusions. In training priority is given to practical and independent work by students.

Registration for the Course: by request at the end of the previous academic year

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

References:

Basic Titles:

1. Кругман П. Р., Международен икономикс, УНСС, София 2014
2. Ганчев Г. Т., Финансите като система, Благоевград, 2010
3. Попов Д., Ценни книжа и фондови борси, Сиела, 2001 г., 367 с.
4. Стоянов С., Фючърси, опции и синтетични ценни книжа, Тракия-М, 1999 г., Б
5. Ганчев Г., Ставрова Е., Международни финанси и финансова политика, Благоевград, 2009.

Additional Titles:

1. 50 Years of Money and Finance: Lessons and Challenges, SUERF, 2013
2. Madura J., Financial Markets and Institutions, South-Western College Publishing, 2001
3. Douglas L. G., Bonds Risk Analysis, New York Institute of Finance, 1990
4. Hyman D., Economics, IRWIN, 1988
5. Gandolfo G., International Monetary Theory and Open Economy Macroeconomics, Springer Verlag, 1987
6. Banking Sector Development in Central and Eastern Europe, Institute for EastWest Studies, 1996
7. Buckle M., Thompson J., The UK Financial System: Theory and Practice, Manchester University Press, 1999
8. Block S., Hirt G., Foundations of Financial Management, RICHARD D. IRWING, INC., 1984
9. Ganchev G., Macroeconomic Problems (The Currency Board Arrangement; Maastricht Criteria; Macroeconomic Policy), in Monitoring of Bulgaria's Accession to the European Union, Friedrich Ebert Stiftung, Sofia 2000
10. Стоименов, Милчо, Финансиране на международната търговия, София, 1999
11. Христов М., Христов С., Книга за парите, АБАГАР, 2002

12. Йорданов Й., Инвестиционни фондове: Структура, мениджмънт, оценка, Варна 2002.
13. Неновски, Николай, Свободните пари, издателство “Проф. Марин Дринов”, БАН, София, 2000 г.

INSURANCE

Semester: 3 semester

Course Type: lectures

Hours per Week: 2 lecture hours per week/Fall Semester

ECTS Credits: 5.0 credits

Lecturer: Assistant Prof. Vladimir Tsenkov, PhD

Department: Department of Finance and accounting, Faculty of Economics, South-West University “Neofit Rilski” – Blagoevgrad, e-mail: v.tsenkov@swu.bg

Course Status: Optional course in M. Sc. Curriculum of Economic Mathematics

Course Description: The goal of the course is to introduce to the students the essence of insurance as a specific type of business and the role of the state in insurance. Different types of insurance contracts are presented with an emphasis on their permanent features and characteristics.

Course contents: Essence, functions and significance of insurance. Types of insurance contracts in the Republic of Bulgaria according to the Insurance Act. Personal and property insurance. Life insurance – types and characteristics. Entering into an insurance contract. Insurance contracts offered in Bulgaria and their characteristics. Covered and uncovered risks. Object and subject of insurance. Insurer’s liability. Insurance sum and insurance premium. Liquidation of damage. Income and expenditures of insurance companies. Reserves and taxation of insurance companies. Marketing strategies in insurance.

Teaching and assessment: Teaching is in the form of lectures. At the beginning of each lecture a short introduction is provided to ease the transition from one topic to another. New topics are discussed with students to achieve continuity of training and help students draw their own conclusions. Lectures are enriched with tables, schemes and practical examples to illustrate theory. The course ends with an examination. In training priority is given to practical and independent work by students. Students are informed about the organization of training, the on-going control, the assessment and examination at the first lecture.

Registration for the Course: by request at the end of the previous academic year

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

References:

1. Илиев, Б., „Застраховане”, изд. „Фабер”, 2013;

2. Христозов, Ж., Димитров, П., „Застрахователни продукти”, издателство на ВУЗФ, 2012;
3. Илиев, Б., Ерусалимов, Р., „Застрахователни продукти”, изд. „Фабер”, 2009;
4. Йотов, Й., Илиев, Б., „Основи на застраховането”, Свищов, 2004;
5. Илиев, Б. и др., „Основни принципи на застраховането”, изд. Свищов, 2008;
6. Драганов, Хр., Близнаков, Й., „Застраховане”, изд. Тракия-М, 2000;
7. Драганов, Хр., Нейков, М., „Имуществено и лично застраховане”, изд. Тракия-М, 2008;
8. Габровски, Р. и др., „Корпоративен риск мениджмънт”, Свищов, 2004;
9. Георгиев, Р., "Управлението на риска и застраховането", учебно помагало http://www.rgeorgiev.com/p/blog-page_2744.html, 2010;
10. Василев, В., „Рисково-базиран надзор върху работата на неживото-застрахователните дружества в България”, изд. „Фабер”, 2010;
11. Наредба за реда и методиката за образуване на застрахователните резерви;
12. Застрахователен кодекс;

ECONOMETRICS

Semester: 1 semester

Course Type: lectures

Hours per Week: 2 lecture hours per week/Fall Semester

ECTS Credits: 5.0 credits

Lecturer: Assoc. Prof. Ivan Trenchev, PhD

Department: Department of Electrical Engineering, Electronics and Automatics, Faculty of Engineering, South-West University “Neofit Rilski” – Blagoevgrad,
tel. +35973588532, e-mail: trenchev@swu.bg

Course Status: Optional course in M. Sc. Curriculum of Economic Mathematics

Course Description: Learn mathematical, programming and statistical tools used in the real world analysis and modeling of financial data. Apply these tools to model asset returns, measure risk, and construct optimized portfolios using the open source R programming language and Microsoft Excel. Learn how to build probability models for asset returns, to apply statistical techniques to evaluate if asset returns are normally distributed, to use Monte Carlo simulation and bootstrapping techniques to evaluate statistical models, and to use optimization methods to construct efficient portfolios. Topics covered include:

- Computing asset returns
- Univariate random variables and distributions
- Characteristics of distributions, the normal distribution, linear function of random variables, quantiles of a distribution, Value-at-Risk
- Bivariate distributions
- Covariance, correlation, autocorrelation, linear combinations of random variables
- Time Series concepts
- Covariance stationarity, autocorrelations, MA(1) and AR(1) models
- Matrix algebra

- Descriptive statistics
- histograms, sample means, variances, covariances and autocorrelations
- The constant expected return model
- Monte Carlo simulation, standard errors of estimates, confidence intervals, bootstrapping standard errors and confidence intervals, hypothesis testing , Maximum likelihood estimation, review of unconstrained optimization methods

Course Objectives: Students should obtain knowledge about basic results and methods for studying various real objects, events, phenomena, etc. by using mathematical methods and computes.

Teaching Methods: lectures

Requirements/Prerequisites: Linear algebra, Numerical Analysis, Mathematical Optimization

Assessment: written final exam on two theoretical topics (grade weight is 60 %); two projects (grade weight is 40 %).

Registration for the Course: by request at the end of the previous academic year

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

References:

1. Introduction in R language, 2013. <http://www.r-project.org/>
2. Numerical Methods in Finance and Economics A MATLAB Based Introduction Second Edition Statistics in Practice, John Wiley & Sons, 2009
3. Applied Statistics Using SPSS, STATISTICA, MATLAB and R, Springer, 2008
4. Хаджиев, В., Статистически и иконометричен софтуер, Варна, Унив. изд. ИУ, 2002, 112с.
5. Knuth D.E. Postscript about NP-hard Problems, SIGACT News, 1974.
6. Reingold E.M., Neivergelt J., Deo N. Combinatorial algorithms (Theory and Practice), 1980.
7. М. Константинов. Въведение в Matlab. Софт Прес 2008.
8. Introduction in MATLAB. www.mathworks.com, 2011

TECHNOLOGIES, COMPETITION AND BUSINESS STRATEGIES IN THE XXI CENTURY

Semester: 1 semester

Course Type: lectures

Hours per Week: 2 lecture hours per week/Fall Semester

ECTS Credits: 5.0 credits

Lecturer: Assoc. Prof. Michail Kolev,

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

Course Status: Optional course in M. Sc. Curriculum of Economic Mathematics

Course Description: Discipline "Technology and competition in the XXI century" is related to the current issues of strategic management and development of strategic thinking. Above all, the main part of the course, along with a significant number of examples is devoted to the new role of IT and managers in business today. Furthermore, key issues of strategy are discussed in the context of contemporary organizations value. They will be useful to students who are interested in more in-depth and systemic understanding of modern business and the development of its strategic thinking.

The course addresses both classic approaches and methods of strategic analysis, and relatively new topics for strategic innovation, creative problem solving business, new understanding of competition-cooperation in ecosystem differences with other perspectives, approaches and methodologies. As a useful addition to offering strategic topics audio information systems. This course does not imply any special prior knowledge and skills in the field of strategic management and sufficient general knowledge of students of bachelor level in science and / or economy.

The program includes a relatively new topics - mostly related to the new role of IT and IT-managers, strategy and strategic thinking in the XXI century adapted for a master's degree in economic mathematics requirements.

Course Aims: The course aims to clarify and acquisition of basic theoretical knowledge and methods of program material, skills for solving problems in the topics, examples and guidelines on the application of the knowledge.

Teaching Methods: lectures

Assessment: written final exam, two problems solving tests per semester

Registration for the Course: by request at the end of the previous academic year

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

References:

1. Василева А. Стратегическо планиране и управление. <http://www.bg-ikonomika.com/2012/11/strategicheskoplanirane-i-upravlenie.html>.
2. Василева А. Стратегическо мислене: http://www.bg-ikonomika.com/2012/10/17_11.html
3. Христов Ст. Стратегическото мислене в бизнеса. "Данъчна практика" С. 2002 № 6,
4. Гибсън, Р., Преосмисляне на бъдещето, С. 2001.
5. Дракър, П., Практика на управлението, С. 2001.
6. Майкълсън, Дж., Сун Дзъ: Изкуството за войната за мениджъри, С. 2001.
7. Райс, А., Дж. Траут, Маркетинговые войны, М. 2000.
8. Дракър, П., Мениджмънт предизвикателствата през 21 век, 2000.
9. The World Bank, World Development Report 2002.
10. Холанд, У., Промяната: стилът на XXI век, 2000.
11. Маринов, Р. Стратегически комуникационни подходи. Стратегически комуникации и управление на знанието, НБУ, 2009. http://ebox.nbu.bg/strategicheski_komunikacii/sk1.html

12. Василева, А. Стратегически мениджмънт. <http://www.bg-ikonomika.com/2012/10/strategicheski-menidjmynt.html>.
13. Василева А. Стратегическо планиране и управление. <http://www.bg-ikonomika.com/2012/11/strategichsko-planirane-i-upravlenie.html>
14. Теорията на хаоса и стратегическото мислене. В сп.Геополитика <http://geopolitica.eu/drugi-statii/933-teoriyata-na-haosa-i-strategicheskoto-mislene> С. 2010
15. Ковачева, Р., Вл. Шопов. Как да мислим ЕС стратегически. <http://www.mediapool.bg/kak-da-mislim-es-strategicheski-news210523.html>. С.2013
16. Антропов М. Стратегия и стратегическое мышление. М. 2012
17. Тасев, М. Синергетика и образование. Педагогика. Кн.10. 2001.

GAME THEORY

Semester: 2 semester

Course Type: lectures and tutorials

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

ECTS Credits: 5.0 credits

Lecturer: Prof. Petar 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 M. Sc. Curriculum of Economic Mathematics

Course Description: Game Theory for Economists studies the interactions of decision makers whose decisions affect each other. The analysis is from a rational viewpoint: every participant would like to obtain the outcome that he prefers most. However, each one has to take into account that the others are doing the same trying to get what they prefer most. At times this leads to fierce competition; at other times, to mutually beneficial cooperation; and in general, to an appropriate combination of these two extreme behaviors. Game theory, which may be viewed as a sort of "unified field" theory for the rational side of social science, develops the theoretical foundations for the analysis of such multi-person interactive situations, and then applies these to many disciplines: economics, political science, biology, psychology, computer science, statistics and law. Foremost among these is economic theory, where game theory is playing a central role.

Course Objectives: Students should obtain knowledge about the game theory and representation the game in Extensive form, Normal form and Characteristic function form.

Teaching Methods: lectures and tutorials

Requirements/Prerequisites: Economics and Mathematical models.

Assessment: written final exam on two theoretical topics (grade weight is 60 %); two projects (grade weight is 40 %).

Registration for the Course: by request at the end of the previous academic year

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

References:

- 1.Introduction to Game Theory, 2012, <http://gametheory.net/lectures/level.pl>
- 2.Game Theory, 2013, Massachusetts Institute of Technology, <http://gametheory.net/lectures/level.pl>
- 3.Robert Gibbons, Game theory for applied economists, Princeton University Press,1992.
- 4.J. McMillan , Games, Strategies and Managers, Oxford, 1992.
- 5.R. Myerson, Game theory:Analysis of conflict, Harvard University Press,1991
- 6.H.Scott Bierman and Luis Fernandez, Game theory with Economic Applications, Addison-Wesley Publishing Company, USA, 1998.

MONTE CARLO NUMERICAL METHODS

Semester: 2 semester

Course Type: lectures and seminars

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

ECTS Credits: 5.0 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 M. Sc. Curriculum of Economic Mathematics

Course Description: The teaching of the discipline includes the study of elements of probability theory, as a basis for Monte Carlo methods of financial mathematics. The main components of this discipline are also studied - the Brownian motion, the technique of variation reduction, stochastic methods of these problems and applications for research of American Options.

Course Aims: Mastering the basic concepts and methods for stochastic study of random variables.

Teaching Methods: lectures and seminars

Assessment: written final exam

Registration for the Course: by request at the end of the previous academic year

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

References:

- 1.Hui Wang, Monte Carlo Simulations with Applications to Finance, A Chapman & Hall, London, New York, 2012

NONLINEAR DYNAMICS AND ECONOMICS

Semester: 2 semester

Course Type: lectures and seminars

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

ECTS Credits: 5.0 credits

Lecturer: Assoc. Prof. Mikhail Kolev,

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

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

Course Status: Optional course in M. Sc. Curriculum of Economic Mathematics

Course Description: The course "Nonlinear dynamics" is optional for students of second semester plan for the master's degree of specialty "Economic mathematics" (two-semester course). Linearization of mathematical methods makes it possible to see significant moments in the dynamics (evolution) of real complicated nonequilibrium systems that are substantially non-linear. Complexity, nonlinearity, "cooperativeness", interconnection, etc. Of modern processes (in particular economic) require the study and application of the dynamic approach, taking into account more and specificity of nonlinear dynamics with its specific conceptual apparatus, with its nonlinear mathematical models especially in the era of explosive developing information technologies and their implications.

Course Aims: The aim of the nonlinear dynamics clarification and acquisition of basic theoretical knowledge and methods of program material, skills for solving problems in the topics, examples and guidelines on the application of the knowledge in the teaching of mathematical, economic and natural sciences.

Teaching Methods: lectures and seminars

Assessment: written final exam, two problems solving tests per semester

Registration for the Course: by request at the end of the previous academic year

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

References:

1. Puu, T. Nonlinear Economic Dynamics. Springer-Verlag Berlin Heidelberg. 1997. (Пyy, Т. Нелинейная экономическая динамика. РХД, Ижевск. 2000)
2. Панчев, Ст. Теория на хаоса (с примери и приложения), ИК "АИ "Проф. М. Дринов", 2002
3. Петерс Э. "Хаос и порядок на рынках капитала". Москва. "Мир", 2000
4. Милованов, В. Синергетика и самоорганизация. Экономика. Бифозика. Москва, 2005
5. Лысенко Ю.Г., и др. "Экономическая динамика", Донецк: ДГУ, 2000
6. Сергеева, Л. "Нелинейная экономика: модели и методы", Запорожье, Полиграф, 2003
7. Lorenz , Hans-Walter. Nonlinear dynamical economics and chaotic motion, Springer-Verlag, 1993

8. Goodwin, R. Chaotic Economic Dynamics, 1990
9. Dechert, D. Chaos Theory in Economics: Methods, Models and Evidence. 1996
10. Мандельброт, Б. Фракталы, случай и финансы, 2004
11. Мандельброт, Б. Регулярная и хаотическая динамика, 2004
12. Zhang W. B., Synergetic Economics, Time and Change in Nonlinear Economics, Springer, Spriar in Synergetics
13. Занг, В.Б. Синергетическая экономика. Время и перемены в нелинейной экономической теории. <http://bookfi.org/book/731035>
14. Васин, В., А.Ряшко. Элементы нелинейной динамики.: От порядка к хаосу. М.И., 2006
15. Haken, H. Synergetics: from physics to economics. Cambridge University Press, 2009
16. Тасев, М., Синергетика и образование, Педагогика, Кн.10. 2001.

TIME SERIES

Semester: 2 semester

Course Type: lectures and seminars

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

ECTS Credits: 5.0 credits

Lecturers: Assoc. Prof. Dr. Preslav Dimitrov

Department: Tourism, Faculty of Economics, South-West University "Neofit Rilski" – Blagoevgrad, tel. +35973588532, e-mail: preslav.dimitrov@swu.bg

Course Status: Optional course in M. Sc. Curriculum of Economic Mathematics

Course Description:

The subject "Time Series" focuses on gaining knowledge and skills in the field of time series and forecasting. Regression models are considered. These models lead to solving different tasks and using different mathematical software. The course will demonstrate the ability of some software packages in the processing of data obtained from various scientific researches. The models will be practically tested. Thorough and detailed understanding of the concepts, principles, approaches and techniques in financial calculations is offered.

Course Aims:

The subject "Time Series" focuses on gaining knowledge and skills in the field of time series and forecasting. Regression models are considered. These models lead to solving different tasks and using different mathematical software. The course will demonstrate the ability of some software packages in the processing of data obtained from various scientific researches. The models will be practically tested. Thorough and detailed understanding of the concepts, principles, approaches and techniques in financial calculations is offered.

Teaching Methods: lectures and seminars

Requirements/Prerequisites: Mathematical Analysis I

Assessment: written final exam, two problems solving tests per semester

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:

1. Bovas Abraham. Johannes ledolter. Statistical Methods for Forecasting, A JOHN WILEY & SONS, INC., PUBLICATIONp 2010
2. Introduction to Time Series Analysis <http://gauss.stat.su.se/gu/e/slidesTime%20Series/Introduction%20to%20Time%20Series%20Analysis.pdf>, 2012
3. H.Scott Bierman and Luis Fernandez, Game theory with Economic Applications, Addison-Wesley Publishing Company, USA, 1998.
4. Norman Matloff. The Art of R Programming, 2011
5. Jim Albert. Bayesian Computation with R, Springer, 2009.
6. Phil Spector. Data Manipulation with R, 2008.