UNIVERSITY OF ECONOMICS - VARNA

FACULTY OF INFORMATICS

DEPARTMENT OF STATISTICS AND APPLIED MATHEMATICS

Adopted by the FC (record №8 / 05.03.2020)
Adopted by the DC (record №7 / 17.02.2020)

ACCEPTED BY:
Dean:
(Prof. Vladimir Sulov, PhD)

SYLLABUS

SUBJECT: "APPLIED MATHEMATICS";

DEGREE PROGRAMME: "International Business", "Business and Management" and "Accounting"; BACHELOR`S DEGREE

YEAR OF STUDY: 1; SEMESTER: 1;

TOTAL STUDENT WORKLOAD: 270 hours; incl. curricular 75 hours

CREDITS: 9

DISTRIBUTION OF STUDENT WORKLOAD ACCORDING TO THE CURRICULUM

TYPE OF STUDY HOURS	**WORKLOAD, hours**	**TEACHING HOURS PER WEEK, hours**
CURRICULAR: incl. • LECTURES • SEMINARS (lab. exercises)	 30 45	 2 3
EXTRACURRICULAR	195	-

Prepared by:

1. **……..…..**
(Prof. Rosen Nikolaev, PhD)

2. **……..…**
(Assoc. Prof. Radan Miryanov, PhD)

Head of department
of Statistics and Applied Mathematics: ……..
(Prof. Rosen Nikolaev, PhD)

I. ANNOTATION

The main aim of the subject „Applied Mathematics" is to generate and cultivate in students skills and erudition for working with all the fundamental mathematical terms and to apply them in solving basic economical problems, inspired from practice.

In the present program a stress is put on those topics from the fundamental mathematical chapters, which concern directly the specialized economical subjects. Basic elements of Linear Algebra and Analytical Geometry are thoroughly considered as well as their applications in economics. Basic subtopics of Financial Mathematics are studied, concerning most of all interests, discounts and annuities. The basic elements of one variable and multivariable functions are observed, putting a stress on those examples which are usually involved in mathematical models of economical processes. Some Combinatorics and Probability topics are also examined, as they concern random processes, often used in economics and seen in practice.

II. THEMATIC CONTENT

№	TITLE OF UNITS AND SUBTOPICS	NUMBER OF HOURS		
		L	S	L.E.
Theme 1. Linear Algebra		**4**	**6**	
1.1	Determinant. Basic Applications			
1.2	Matrix. Rank. Inverse of a Matrix. Matrix Equations			
1.3	Linear System of Equations			
Theme 2. Analytical Geometry		**5**	**7**	
2.1	Line Segments. Vectors			
2.2	Equation of a Line. Slope			
2.3	Angles. Perpendicular and Parallel Lines			
2.4	Distance Between Point and Between a Point and a Line			
2.5	Plane Curves			
Theme 3. Financial Mathematics		**5**	**9**	
3.1	Use of Percentages			
3.2	Simple Interest and Compound Interest			
3.3	Discount. Investment Profitability			
3.4	Annuit			
Theme 4. Calculus – functions of one variable		**6**	**9**	
4.1	Basic Functions. Curve Sketching			
4.2	Limits. Asymptotes.			
4.3	Continuous and Discontinuous Functions			
4.4	Differentiation and Derivatives. Application in Economics			
4.5	Local Extrema of $f(x)$. Basic Applications			
4.6	Integrals (Antiderivatives). Applications.			
4.7	Consumer and Producer Surpluses and Gini Index			
Theme 5. Multivariable Functions		**5**	**7**	
5.1	Partial Derivatives			
5.2	Exact Differential. Gradient			
5.3	Local Extrema of $f(x;y)$			
5.4	The Least Squares Method			
Theme 6. Combinatorics and Probability		**5**	**7**	
6.1	Enumeration, Combination and Permutation of Sets			

6.2	Probability Axioms			
6.3	Basic Probability Theorems			
6.4	Random Variables			
	Total:	**30**	**45**	

III. FORMS OF CONTROL:

№	TYPE AND FORM OF CONTROL	Number	extracur-ricular, hours
1.	**Midterm control**		
1.1.	Course Project / Term Homework	1	40
1.2.	Tests	2	60
	Total midterm control:	**3**	**100**
2.	**Final term control**		
2.1.	Examination (test)	1	95
	Total final term control:	**1**	**95**
	Total for all types of control:	**4**	**195**

IV. LITERATURE

REQUIRED (BASIC) LITERATURE:

1. Nikolaev, R., R. Miryanov, T. Milkova *Applied Mathematics*, University Publishing House "Science and Economics", University of Economics – Varna, 2020.

RECOMMENDED (ADDITIONAL) LITERATURE:

1. Logan, J.D. et al. *Applied Mathematics*, Wiley, 2013.

2. Byleen, K.E. et al. *College Mathematics for Business, Economics, Life Sciences, and Social Sciences*, Pearson, 2014.

3. Lancaster K. *Mathematical Economics*, Dover Publications, 2011.