UNIVERSITY OF ECONOMICS - VARNA
FACULTY OF INFORMATICS
DEPARTMENT OF STATISTICS AND APPLIED MATHEMATICS

Adopted by the FC (record № 9/ 24.04.2024)

Adopted by the DC (record № 6/ 15.04.2024)

ACCEPTED BY:

Dean:

(**Prof. Vladimir Sulov, PhD**)

SYLLABUS

SUBJECT: FUNDAMENTALS OF MATHEMATICS

DEGREE PROGRAMME: Computer Science; MASTER`S DEGREE

YEAR OF STUDY: 5 for other field graduates; SEMESTER: 10 for other field graduates

TOTAL STUDENT WORKLOAD: 360 hours; incl. curricular 60 hours

CREDITS: 12

DISTRIBUTION OF STUDENT WORKLOAD ACCORDING TO THE CURRICULUM

TYPE OF STUDY HOURS	WORKLOAD, hours	TEACHING HOURS PER WEEK, hours
CURRICULAR: incl.		
• LECTURES	30	2
• SEMINARS / LAB. EXERCISES	30	2
EXTRACURRICULAR	300	-

Prepared by:

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

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

**Head of department
of Statistics and Applied Mathematics:** ………………………………………
(**Assoc. Prof. Tanka Milkova, PhD**)

I. ANNOTATION

The main aim of the subject „Fundamentals of mathematics" is to generate and cultivate in students skills and erudition for working with all the fundamental mathematical terms and to apply them in IT models, computer graphics and other 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 computer subjects. Basic elements of Linear Algebra and Analytical Geometry are thoroughly considered as well as their applications in computer science. Basic subtopics of Calculus are studied, concerning most of all functions, derivatives and integrals. The basic elements of one variable and multivariable functions are observed, putting a stress on those examples which are usually involved in IT models.

The course "Fundamentals of mathematics" develops the following key competencies:

- Mathematical competence, expressed in the ability and desire to use mathematical ways of thinking and presentation (formulas, models and graphs) for problem solving.

- Digital competence, expressed in the ability to use digital information and the use of software to solve mathematical problems.

II. THEMATIC CONTENT

No	TITLE OF UNITS AND SUBTOPICS	NUMBER OF HOURS		
		L	S	L.E.
1. Linear Algebra		**8**	**8**	
1.1	Determinant. Basic Applications			
1.2	Matrix. Rank and Operations			
1.3	Inverse of a Matrix. Matrix Equations. Gauss-Jordan Method			
1.4	Linear System of Equations. Methods of Gauss and Cramer			
2. Analytic Geometry		**8**	**8**	
2.1	Co-ordinate systems. Vectors – Basic Operations			
2.2	Equation of a Line. Slope. Intersection Points			
2.3	Lines and Curves in 3D. Planes and Surfaces			
2.4	Changes of Co-ordinate Systems. Affine Transformations			
3. Calculus		**14**	**14**	
3.1	Series and Limits. Convergent Series			
3.2	Functions of One Variable. Limits and Discontinuity			
3.3	Derivative and Differential of a Function. L'Hospital's Rule			
3.4	Examining Functions			
3.5	Multivariable Functions. Partial Derivatives, Applications			
3.6	Local Extreme Points of Multivariable Functions			
3.7	Integrals – Indefinite and Definite. Applications			
	Total:	**30**	**30**	

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	200
	Total final term control:	**1**	**200**
	Total for all types of control:	**4**	**300**

IV. LITERATURE

REQUIRED (BASIC) LITERATURE:
1. James Van Dyke et al. (2012) Fundamentals of Mathematics, 10-th edition, Belmont.
2. Gareth J. Janacek et al. (2013) Mathematics for Computer Scientists, bookbon.com

RECOMMENDED (ADDITIONAL) LITERATURE:
1. Geoffrey Akst et al. (2009) Fundamental Mathematics through Applications, Pearson.
2. Nikolaev, R., R. Miryanov, T. Milkova. Applied Mathematics, University Publishing House "Science and Economics", University of Economics – Varna, 2020.