COURSE UNIT DESCRIPTION

Course unit title	Code
Algebra and Geometry	**1BIOAG**

Lecturer(s)	Faculty
Coordinating: Gintautas Bareikis	Faculty of Mathematics and Informatics

Study cycle	Type of the course unit
First cycle	Privalomas

Mode of delivery	Period of implementation	Language of instruction
Face-to-face	1 semester	Lithuanian English

Requisites
Prerequisites: School program -

Number of ECTS credits allocated	Student's workload (total)	Contact hours	Individual work
5	132	64	72

Purpose of the course unit and programme competences to be developed

Purpose of the course unit:

To get acquainted with the basic knowledge of linear algebras and analytical geometry.

Generic competences:

- Ability to apply the knowledge of mathematics in practice (BK2)

Specific competences:

Understand and operate freely in basic mathematical methods of algebra and geometry,describing the quantitative properties of the simulated phenomena; and relationships. (DK4)

Learning outcomes of the course unit	Teaching and learning methods	Assesment methods
Have acquired knowledge in mathematical concepts and methods	Lectures, seminars, analysis of exercises, consultations, discussions, tutorials Problem sets at home	Check on of answers and solutions to the given exercises, examinations of answers to the theoretical questions of the mid-term and final exams
Construct mathematical arguments and communicate them in a clear manner through written		
To formulate and prove statements		
Expand own understanding, knowledge and skills working on problem sets independently		

Temos	Contact work hours						Self-study hours and tasks	
	Lectures	Tutorials	Seminars	Workshops	Laboratory work	**Contact hours, total**	**Individual work**	**Assignments**
1.Systems of linear equations. Gauss-Jordan method	4			4		**8**	**8**	Studies of literature, example problem. The individual and group set of exercises for work at the class and at home.
2. Matrix algebra. Determinants. Matrix inverse. Matrix equations, inverse matricx method, Cramer‘s method, linear regression in matrix form	6			4		**10**	**10**	
3. Complex numbers. Properties of operations. Formula DeMoivre	4			4		**8**	**10**	
4. Introduction to analytical geometry. Line equation in plane. Plane and line equations in three dimensional space	4			4		**8**	**10**	
5. Quadratic forms, positive and negative (semi-)definite matrices.	2			4		**6**	**8**	
6. Euclidean spaces. Subspaces. Gramm-Schmidt alghorithm	6			6		**12**	**14**	
7. Linear transformations and their matrices. Image, kernel. Eigenvalues. Linear transformations and their applications	6			6		**12**	**12**	
Total	**32**			**32**		**64**	**72**	

Assessment strategy	**Weigh %**	**Deadline**	**Assesment criteria**
Quizzes	20	Throughout the semester	Closed and open ended problems. The exhaustiveness of the answer and the ability to creatively apply mathematical methods will be given a bonus. The answers to the test questions are credited with points. The accumulated grade will be calculated according to the defined rule.
Colloquim	40	Middle of semester	Closed and open ended problems, with a focus on mathematical rigour and ability to apply mathematical tools in informatics. The exhaustiveness of the answer and the ability to creatively apply mathematical methods will be given a bonus. Rigour and depth of solutions.
Exam	40	End of semester	Exam consists of theory questions and exercises (from the second part of the course). Rigour and depth of solutions of the solutions will be evaluated.

Authors	Years of issue	Title	Number of the periodical volume or tome	Publishing place and publisher or web link
Required reading				
G. Bareikis	2020	Linear algebra and geometry	Lecture notes	In Moodle
H.Anton,C.Rorres	2005	Elementary Linear Algebra: Applications Version		John Wiley and Sons
Recommended reading				
K.Matthews	2010	Elementary Linear Algebra. Lectures Notes		http://www.numbertheory.org/book/
E.H.Connel	2004	Elements of Abstract and Linear Algebra		http://www.math.miami.edu/~ec/book/