Course unit title:	Linear Algebra		
Course unit code:	AMAT181		
Type of course unit:	Compulsory		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:			
Semester when the unit is delivered:			
Number of ECTS credits allocated :	5		
Name of lecturer(s):	…		
Learning outcomes of the course unit:	1. Explain the notion of a matrix, including its transpose, identify the properties of special types of matrices and perform different matrix operations. 2. Generate determinants of any order using minors, compute 2x2, 3x3 determinants directly and find the inverse of a matrix by employing its determinant and the transpose of the matrix of cofactors. 3. Use Cramer's Rule for solving square linear systems with the aid of determinants, employ Gaussian Elimination for solving systems of linear equations, perform elementary row matrix reduction to echelon form and back substitution to obtain the solution of the system, apply Gauss-Jordan Elimination to find the inverse of a square matrix using augmentation, and implement a readily available inverse of the matrix of coefficients to solve a square linear system. 4. Explain the notion of multiplicity of roots of the characteristic equation and compute eigenvalues and corresponding eigenvectors of square matrices. 5. Define the notion of vectors in two, three and higher dimensions, perform operations with vectors including dot and cross vector products, determine linear independence of vectors, explain the notion of vector spaces and subspaces, and outline the concept of an orthogonal basis of the Euclidean space. 6. Define linear transformations, perform elementary transformations available, and apply these concepts to real-life examples identifying their geometric implications. 7. Employ the computer programming language Matlab to solve different matrix operations and systems of linear equations, to compute eigenvalues and eigenvectors, to execute elementary vector manipulation, and determining linear dependence between vectors.		
Mode of delivery:	Face-to-face		
Prerequisites:	None	Co-requisites:	None

Recommended optional program components:	None
Course contents:	**Matrices and Determinants.** Matrix concept, operations with matrices, Special matrices, definition of a determinant and its properties, determinant of a product, inverse matrix, properties and computation. **Simultaneous Linear Equations.** Cramer's rule, Gaussian elimination, Gauss-Jordan elimination, geometric interpretation. **Vectors and Linear spaces.** Vector concept, operations with vectors, vector products, generalization to higher dimensions, vector spaces and subspaces, Euclidean space, basis, linear dependence. **Linear Transformations.** Definition of linear transformations, properties, elementary transformations. **Eigenvalue Problem.** Eigenvalue problem, characteristic equation, eigenvalues and eigenvectors. **MATLAB Applications:** Basic matrix algebra, computing determinants, solving systems of linear equations with a number of different techniques, finding eigenvalues and eigenvector, elementary vector manipulation, and determining linear dependence of vectors.
Recommended and/or required reading:	
Textbooks:	Gareth W., *Linear Algebra with Applications*, Jones and Barlett Pubs, 2000.
References:	Anton H., *Elementary Linear Algebra with Applications*, John Wiley, 2000. Anton H., *Contemporary Linear Algebra MATLAB Technology Resource Manual*, John Wiley, 2002.
Planned learning activities and teaching methods:	The taught part of course is delivered to the students by means of lectures, conducted with the aid of computer presentations. Lecture notes and presentations are available through the web for students to use in combination with the textbooks. Computer Laboratories are utilized for special Matlab sessions, students learn how to use Matlab effectively, develop the functional units taught in lectures and gain greater insight into the underline mathematics. Several examples and exercises are solved in class to practice the theory and methodology taught. Students work on their own during class hours on examples and practice problems. Extra assignments are given to students to tackle at home, including exercises using MATLAB.
Assessment methods and criteria:	• Tests: 40% • Final Exam 60%
Language of instruction:	English
Work placement(s):	No