SYLLABUS

Name: ***Algebra and analytic geometry (Math 1) (AESAu-E>SI1AAG24)***
Name in Polish: **Algebra i geometria analityczna**
Name in English: ***Algebra and analytic geometry (Math 1)***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

EGZ

Language:

English

Short description:

This course aims to enable students to master single-variable calculus, multivariable calculus, analytic geometry in space, and differential equations

Description:

ECTS: 10
Lecture:45h
Exercise: 30h
Student's own work: preparation for classes, writing reports, preparation for tests

Lecture
1. The determinant:
1.1. The second and third order determinants.
1.2. Full arrangement and exchange.
1.3. Definition of the determinant of order n.
1.4. Properties of the determinant.
1.5. The determinant is expanded in rows (columns).
2. Matrix and its operation:
2.1. Linear equations and matrices.
2.2. Operation of matrix.
2.3. Inverse matrix.
2.4. Matrix block method.
3. Elementary transformation of matrices and linear equations:
3.1. Elementary transformation of matrix.
3.2. The rank of the matrix.
3.3. Solutions of linear equations.
4. Linear dependence of a vector set:
4.1. Vector group and its linear combination.
4.2. Linear correlation of vector groups.
4.3. The rank of the vector group.
4.4. The structure of solutions of linear equations.
5. Similarity matrix and quadratic form:
5.1. Inner product, length and orthogonality of vector.
5.2. Eigenvalues and eigenvectors of square matrices.
5.3. Similarity matrix.
5.4. Diagonalization of symmetric matrices.
5.5. Quadratic form and its standard form.
5.6. With the method of collocation of quadratic form into standard form.
6. Positive definite quadratic.

Bibliography:

1. Alan Beardon, Algebra and Geometry, Cambridge University Press.
2. Giovanni Landi, Alessandro Zampini, Linear Algebra and Analytic Geometry for Physical Sciences, Springer International Publishing AG.

Learning outcomes:

Students are expected to obtain the following mathematical knowledge and abilities through theoretical teaching of this course:
1. Knows the concepts and theories of linear algebra, including determinants, matrices, linear correlation of vectors, linear equations, similar matrices and other basic concepts, related properties and theorems (K1A_W1).
2. Understand and apply the basic calculation methods of linear algebra, cultivate rigorous logic mathematical reasoning ability. To be specific, students should master the calculation method of concrete as the determinant, matrix calculations, the solution of linear equations, the real symmetric matrix orthogonal similar to diagonal matrix method and the method of converting quadratic form into standard form and so on. Students can apply the knowledge to analyse and solve complex engineering problems (K1A_W7).
3. Is able to apply the concepts, theories and methods in linear algebra, and be able to analyse or solve problems by using linear algebra thinking method.. Moreover, learning this course will also help students to get ready for follow-up courses as well as broaden their horizons in mathematics (K1A_U1).

Assessment methods and assessment criteria:

The condition for completing the course is passing all the tests during the exercises and passing the exam

Course credits in various terms:

<without a specific program>

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	10	2024/2025-Z	