COURSE DESCRIPTION CARD - SYLLABUS

Course name
Linear algebra [S1Inf1>ALIN]

Course

Field of study
Computing

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
16

Laboratory classes
0

Other
0

Tutorials
16

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

1.Mathematical knowledge from the secondary school" 2. Ability to solve problems and mathematical modeling at the level of secondary school.

Course objective

1.Learning algebraic structures and method of classical and linear algebra. 2.Learning the methods and applications of analytic geometry.

Course-related learning outcomes

Knowledge:
1. has knowledge of the matrix, operations on matrices, determinants of matrices, inverse matrix calculation, the use of matrix to solve systems of linear equations
2. has knowledge of basic algebraic structures -monoids, groups, rings and fields has knowledge of the roots of polynomials, also in the set of complex numbers
3. has knowledge of n-dimensional vector space, database space, database changes, eigenvalues of matrix has knowledge of the operations on vectors in three-dimensional space, the basic geometric creations -a line, planes, quadrics

4. has knowledge of complex numbers, operations with complex numbers, complex numbers form and their applications
5. has knowledge of the operations on vectors in three-dimensional space, the basic geometric creations
6.has knowledge of the roots of polynomials, also in the set of complex numbers

Skills:
1. Can operate on complex numbers, can find certain types of complex roots of polynomials
2. can perform operations with matrices, can find an inverse matrix using elementary operations method, calculate the determinant of a matrix, solve the system of linear equations using Gaussian method of elimination
3. is able to recognize the algebraic structures, can apply the structure of monoid and group to describe the state of semi-automaton and automaton
4. can determine the dimension of space and linear subspace, can solve the matrix eigenvalue problem.
5. can perform operations on vectors in three-dimensional space and apply the methods of vector calculus

Social competences:
1. He can think and act precisely in the area of process description in technical science

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture:
assess the knowledge and skills listed on the written test including the theoretic part of the subject
Classes:
-testing and rewarding of knowledge needed for solving posed problems (solving tasks),
-assessment of knowledge and skills
-tests,
-the activity during classes causes the upgrade of the classes evaluation.

Programme content

Lecture:
1 Calculus matrix and its applications.
2. IAlgebraic structures.
3. Vector spaces (n-dimensional)
4. Eigenvalues and eigenvectors of matrix.

Course topics

Lecture:
1 Calculus matrix and its application sum of matrices, product of matrices.
2. Inverse matrix. The Gauss - Jordan method.
3. Determinant of square matrix.
4. Solving systems of linear equations. Kronecker - Capelli theorem. Rang of matrix.
5. Algebraic structures: monoids, infinite and finite groups, homomorphism of groups.
6. Rings, homomorphism of rings, ring of polynomials, fields.
7. Vector spaces (n-dimensional), linear space, linear transformations, analytical geometry of 3-dimensional space. Eigenvalues and eigenvectors of matrix.
Classes:
1.Complex numbers and their applications.
2. Polynomials, real roots and complex root of polynomial.
3.Product of matrices. Inverse matrix. The Gauss - Jordan method. Determinant of square matrix.
4. Solving systems of linear equations.
5. Infinite and finite groups, linear space, linear transformations.
6. Eigenvalues and eigenvectors of matrix.

Teaching methods

-lectures

1. lecture led in interactive way with questions formulating to group,
2. the students" activity is taken into account during the final evaluation (the preparation of historical reports connected with the mathematicians" related to material),
3. in track of lecture initiating the discussion,
4. theory presented with connections of current knowledge from previous lectures.
-classes
1. solving on board example tasks,
2. detailed the reviewing by leader the solutions of tasks of practice and the discussions over comments,
3. the students" activity is taken into account during the final evaluation

Bibliography

Basic
1. W. Leksiński, I. Nabiałek, W. Żakowski, Matematyka. Definicje, twierdzenia, przykłady, zadania, seria EIT, WNT Warszawa 1992 (i późniejsze)
2. T.Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Wydawnictwo GiS
3. W.J. Gilbert, W.K. Nicholson, Algebra współczesna z zastosowaniami, WNT Warszawa 2008
4. M. Grzesiak, Liczby zespolone i algebra liniowa, Wydawnictwo PP Poznań 1999
5. S. Przybyło, A. Szlachtowski, Algebra i wielowymiarowa geometria analityczna w zadaniach, WNT Warszawa 1992 (i późniejsze)
Additional
1. .J. Gilbert, W.K. Nicholson, Algebra współczesna z zastosowaniami, WNT Warszawa 2008

Breakdown of average student's workload

	Hours	ECTS
Total workload	52	2,00
Classes requiring direct contact with the teacher	32	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00