



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Algebra - Algebra

Course

Field of study

Teleinformatics

Year/Semester

1/1

Area of study (specialization)

Profile of study

general academic

Level of study

first-cycle studies

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

Tutorials

15

Projects/seminars

0/0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

dr Tomasz Kiwerski
Wydział Automatyki, Robotyki i Elektrotechniki,
ul. Piotrowo 3A, 60-965 Poznań,
e-mail: tomasz.kiwerski@put.poznan.pl
tel. 61 665 2807

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Prerequisites



High school level mathematical knowledge and the ability to use it in some specific practical situations.

Course objective

To provide students with basic knowledge of algebra, in particular, about the field of complex numbers, linear algebra and some structures of abstract algebra. Developing abstract thinking skills, as well as the ability to apply the acquired knowledge in more practical issues.

Course-related learning outcomes

Knowledge

Student has a knowledge of the basis of linear and abstract algebra.

Skills

Student should know the basic methods of linear algebra and be able to illustrate the most important theorems and definitions with appropriate examples.

Social competences

Student should know the limitations of his own knowledge and understand the need to expand his skills. In addition, he should understand the need to be precise in expressing his thoughts and the value of theoretical thinking.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - test (with some possible exercises included) at the end of the semester.

Tutorials - test and assessment of activity in the classroom.

Programme content

Complex numbers; matrix calculus; linear systems; vector spaces; linear operators; diagonalization of matrices; groups and rings.

Complex numbers via Hamilton's construction; de Moivre's formula; roots of complex polynomials; matrix calculus; Laplace expansion (cofactor expansion); Gauss' algorithm; vector space; basis and dimension of a vector space; linear operator; eigenvalues and eigenvectors; diagonalization; symmetries; group of permutations; group action; homomorphism; image and kernel of a homomorphism; rings; modular arithmetic; finite fields.

Teaching methods

Lectures: theory presented in relation to the students' current knowledge; initiating discussions frequently during the lecture; introducing new topics preceded by numerous examples and motivations; recommending materials for self-study and supplementing knowledge.



Tutorials: tasks closely related to the theory presented during the lecture; solving example tasks on the blackboard; detailed reviewing of the solutions to the tasks by the teacher and discussion of the comments; taking into account the activity of students during classes when assigning the final grade.

Bibliography

Basic

- [1] A. I. Kostrykin, Wstęp do algebry. Podstawy algebry, 2012.
- [2] T. Jurlewicz i Z. Skoczylas, Algebra liniowa 1, 2003.

Additional

- [1] M. Grzesiak, Liczby zespolone i algebra liniowa, 1999.
- [2] J. Rutkowski, Algebra liniowa w zadaniach, 2008.

Breakdown of average student's workload

| | Hours | ECTS |
|---|-------|------|
| Total workload | 56 | 3.0 |
| Classes requiring direct contact with the teacher | 30 | 2.0 |
| Student's own work (preparation for tests, preparation for tutorials, literature studies) | 26 | 1.0 |