

SYLLABUS

Name: **Algebra and analytic geometry (MakAu>SI1AAG19)**

Name in Polish:

Name in English: **Algebra and analytical geometry**

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

Course homepage:

<https://platforma2.polsl.pl/rau1/course/view.php?id=119>

Short description:

The aim of education is the efficient use of the basic mathematical apparatus necessary for further study, such as those related to complex numbers, matrix and vector calculus, and systems of linear equations. Students should also learn to formulate problems and describe them in the language of algebra, as well as interpret results.

Knowledge of mathematics at the high school level is required.

Description:

ECTS: 5

Total workload: 125 hours (65 contact hours, 60 students' own work hours)

Forms of contact hours:

Lecture: 30h

Classes: 15h

Other (e.g. test revision and discussion, homework evaluation) 20h

Students' own work: 60h preparation for lectures and classes, own work with educational materials available on PZE platform, preparation for tests and exam)

Lectures:

- a) Complex Numbers (def., operations in C, polar form, roots of complex numbers, exponential form); Polynomials;
- b) Matrices and Determinants; System of Linear Equations (Gaussian Elimination, Cramer Rule, homogenous systems, rank, Kronecker-Capelli Theorem,);
- c) Analytical Geometry (calculus of vectors, Line and plane In 3D space, curves of third-degree);

Classes:

solving tasks and problems corresponding to the content introduced and discussed during the lecture

The teaching methods used are:

- Lectures, illustrated with slides, are conducted by the traditional method. During lectures, the necessary definitions and theorems (always illustrated by examples) are presented and discussed. Slides are available on the platform.
- Classes, during which practical problems related to currently discussed chapters are solved and discussed with students; materials useful in classes (e.g. sample sets of tasks) are placed on PZE platform.

Both during the lectures, and especially during the classes, students are expected to be active.

Bibliography:

- 1) Cheney, Koncaid: Linear Algebra. Theory and Applications, Jones and Bartlett Publishers, 2009.
- 2) Kolman, Hill: Elementary Linear Algebra with Applications, Pearson International Edition, 2008.
- 3) Larson, Edwards: Elementary Linear Algebra, D.C. Heath and Company, 1991.
- 4) Fraleigh, Beauregard: Linear Algebra, Addison-Wesley Publishing Company, 1999
- 5) Grzymkowski: Matematyka dla studentów wyższych uczelni technicznych, Wyd. Pracowni Komputerowej Jacka Skalmierskiego, 1999 (in Polish)
- 6) Jurlewicz, Skoczylas: Algebra liniowa 1 i 2. Definicje, twierdzenia, wzory. Oficyna Wydawnicza GiS. Wrocław 2001. (in Polish)
- 7) Krysić, Włodarski, Analiza matematyczna w zadaniach, cz.I (in Polish)
- 8) Grzymkowski, Zbiór zadań z matematyki (wybrane działy) (in Polish)
- 9) Adrianowicz, Nowak, Po co nam ta Matematyka, Zastosowania algebry liniowej nie tylko dla studentów pierwszych lat studiów technicznych (in Polish)

Learning outcomes:

Course-specific learning outcomes: Student who complete the course

knows and understands

the concept of complex number and operations in the set C, operations in the set of matrices, methods of solving systems of linear equations, operations on vectors, and concepts related to analytic geometry in R^3 (test, exam) K1A_W02;

can:

perform operations in the set of complex numbers and on matrices, solve simple matrix equations, solve arbitrary systems of linear equations, perform operations on vectors, determine the equation of a line and a plane in R^3 and determine their properties (test) K1A_U09

Assessment methods and assessment criteria:

First two educational effect (subpoints a,b above) will be examined on the short test, organized during the lecture.

Information about the term of the test will be given not later than 2 weeks before. For each effect, the student can get 15 points. The effect is passed after obtaining min. 40% of the points (i.e., not less than 6).

Pass of all the learning effects is a necessary condition for completion of the semester. The mark Z for passing the classes (the first component of the final grade) is determined in percentages.

The absence on the test without excuse (sickness, etc.) results in an unsatisfactory mark for effect examined in the term.

USOSweb: Szczegóły przedmiotu: MakAu>SI1AAG19, w cyklu: <brak>, jednostka dawcy: <brak>, grupa przedm.: <brak>

The syllabus is effective from the 1st semester / academic year 2025/26, and its content is not subject to change during the semester

In class, the student can get an additional 5 points for the activity (these points we do not associate with the effects, but they can raise the final grade).

Students who haven't passed some of the education effects may try to give it during the correction colloquium organized on the last lecture in the semester (or possibly on an additional term in session). The maximum number of points that can be obtained in the correction term is half of all possible points in the test (ie. 8 points).

Persons wishing to improve already passed effects will be able to do this during the correction test. Only one-time attempt is permitted. The grade Z will include the number of points obtained on the improvement (even if it is less than the one obtained earlier).

Only students who have passed at least one effect may take the final exam in session.

After the first semester, there is an exam in the form of a multiple-choice test. The exam is passed after obtaining a minimum of 40% points. The grade E obtained on the exam is the second component on the basis of which the final grade is determined after the second semester.

There is an opportunity to pass the exam if the student obtains at least 40% of the points from each theoretical quiz organized during the semester (after each chapter).

After passing all practical effects (a), (b) and passing the theoretical exam, the final grade (calculated as $0.7 * Z + 0.3 * E$) is determined on the basis of the following scale:

(< 39%) unsatisfactory,
(40% – 60%) satisfactory (3,0),
(60% – 65%) satisfactory plus (3,5),
(65% – 80%) good (4,0),
(80% – 85%) good plus (4,5),
(> 85%) very good (5,0).

Course credits in various terms:

<without a specific program>				
Type of credits	Number	First term	Last term	
European Credit Transfer System (ECTS)	5	2020/2021-Z		