# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Selected topics in Mathematics [N1MiBP1>WZM]

## Course

Field of study
Mechanical and Automotive Engineering

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

## Number of hours

Lecture
18

Laboratory classes
0

Other
0

Tutorials
9

Projects/seminars
0

## Number of credit points

4,00

## Coordinators

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## Lecturers

## Prerequisites

1. Knowledge of algebra and geometry, differential calculus and integral calculus of functions of one variable in the scope of the 1st semester of study. 2. Logical thinking, learning with understanding, the use of textbooks. 3. Willingness to acquire new knowledge and the need for systematic self-education.

## Course objective

1. Getting to Know the issues of algebra and geometry and the possibility of their application in subjects directional.

## Course-related learning outcomes

Knowledge:
Has knowledge in the field of mathematics, including algebra, analysis, theory of differential equations, probability, analytical geometry necessary to: describe the operation of discrete mechanical systems, understand computer graphics methods, describe the operation of electrical and mechatronic systems.
Has knowledge in the field of physics, including the basics of classical mechanics, optics, electricity and magnetism, solid state physics, quantum and nuclear physics, necessary to understand specialist lectures in the field of the theory of construction materials and materials science, theory of machines

and mechanisms, theory of electric drives and mechatronic systems.
Has extended basic knowledge necessary to understand specialist subjects and specialist knowledge about the construction, construction methods, manufacturing and operation of a selected group of working, transport, thermal and flow machines covered by the diploma path.

Skills:
Can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions.
Has the ability to self-educate with the use of modern teaching tools, such as remote lectures, websites and databases, teaching programs, e-books.
Can prepare and present a short verbal and multimedia presentation devoted to the results of an engineering task.

Social competences:
Is ready to critically assess his knowledge and received content.
Is ready to initiate actions for the public interest.
Is willing to think and act in an entrepreneurial manner.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture:
Assessment on the basis of a written exam conducted during the exam session at the end of the semester. The assessment also takes into account the student"s activity during classes.
Tutorials:
Assessment on the basis of 2 tests and activity in the classroom.

## Programme content

Update 2024/2025
Complex numbers.
Matrices and determinants.
Systems of linear equations.
Vectors in three-dimensional space.
Analytical geometry in space.

## Course topics

Update 2024/2025
Complex numbers (algebraic, trigonometric, exponential, action, Moivre"s formula, Euler"s patterns, polynomials). Matrices and determinants (actions, properties, Laplace theorem). Systems of linear equations (Cramer"s theorem, Kronecker-Capelli theorem). Geometry in three-dimensional space (actions on vectors and their properties, a straight line and a plane in space).
Analytical geometry in space; equation of plane and line, mutual position of line and plane. Equations of solids in space; cylinder, paraboloid, hyperboloid, cone, sphere.

## Teaching methods

Lecture:
At the lecture, the theory is supported by examples. The lecture is conducted in an interactive way with formulating questions towards students. Completed with self-solve tasks, which are verified and have an impact on the final grade.
Tutorials:
The exercises include an example of solving tasks on the blackboard (by the teacher and students) along with the analysis of subsequent stages. The way students solve the problem on the blackboard is reviewed by the tutor.

## Bibliography

Basic

1. H. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Oficyna Wydawnicza GiS, Wrocław 2006.
2. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka cz. I, II,III, Wydawnictwo Politechniki Poznańskiej, Poznań 2001.
Additional
1. Dennis G. Zill, Calculus with Analytic Geometry, Prindle,Weber & Schmidt, Boston 1985.

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 100 | 4,00 |
| Classes requiring direct contact with the teacher | 32 | 2,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 68 | 2,00 |