COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [S1FT2>Mat1]

Course

Field of study
Technical Physics

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
60

Laboratory classes
0

Other (e.g. online)
0

Tutorials
45

Projects/seminars
0

Number of credit points

8,00

Coordinators

dr Leszek Wittenbeck
leszek.wittenbeck@put.poznan.pl

Lecturers

dr Marek Adamczak
marek.adamczak@put.poznan.pl

Prerequisites

High school mathematics knowledge, basic algebraic and trigonometric identities. The ability to solve mathematical problems based on the possessed knowledge, the ability to obtain information from the indicated sources. Understanding the need to expand your competences, readiness to cooperate within the team.

Course objective

1. To provide students with basic mathematical content concerning differential and integral calculus of functions of one variable, algebra with geometry and differential calculus of many variables. 2. Developing students' skills in solving exercises and mathematical problems. 3. Shaping students' teamwork skills.

Course-related learning outcomes

Knowledge:
As a result of the conducted classes, the student:
knows the mathematical apparatus necessary to describe the basic laws of physics and solve problems related to technical physics, including: the basics of differential and integral calculus, linear algebra and analytical geometry

Skills:
As a result of the conducted classes, the student should demonstrate the following skills (the student will be able to):
can use acquired mathematical knowledge to describe processes, create models, write algorithms in the field of technical physics

Social competences:
As a result of the course, the student will acquire the competences listed below. Completing the course means that:
can work independently and in a team on a given task, shows responsibility in this work

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: written or oral exam in theory and tasks.
Classes: ecaluation of written tests during the semester and the direct activity during the classes. Getting extra points related with activity(presentations of examples of applications of mathematics, use of literature, discussion of problems, presenting reports concerning applications of the theory and diligence of the study).

Programme content

Revision and extension of the basic messages on algebraic and trigonometric identities
Elements of differential calculus:
-string limit, function limit, derivative of one variable function,
-basic techniques of calculating derivatives,
- geometric and physical application of the derivative,
- the mean value of Lagrange and Cauchy,
-extrema and inflection points of functions.
Elements of algebra and geometry.
-algebra of complex numbers, algebraic form of a complex number,
-basic arithmetic operations on complex numbers.
-Gaussian plane and trigonometric form of a complex number,
- de Moivre's formula,
- the concept of matrix and determinant,
- basic matrix operations
-elements of vector algebra, dot product, vector product,
- line and plane alignment in space.
-selected methods of solving systems of linear equations.
Elements of differential calculus of functions of several variables.
-the concept of a partial derivative,
-partial derivatives of a complex function,
- higher order derivatives, Schwarz theorem,
- the concept of a function gradient, geometric applications.
Numerical and power series.
-numerical series, series convergence,
-power series, Taylor and Maclaurin series.
Elements of integral calculus.
- the concept of a primary function and an indefinite integral,
-basic techniques for calculating indefinite integrals,
- definite integral, mean value theorem,
- geometric and physical applications of the definite integral,
-improper integral,
- integral depending on the parameter.

Course topics

none

Teaching methods

1. Lecture: multimedia presentation, solving sample tasks on the blackboard,
2. Exercises: problem solving, discussion.

Bibliography

Basic:
1. F. Leja, Rachunek różniczkowy i całkowy ze wstępem do równań różniczkowych, PWN 2018.
2. W. Krysicki, L. Włodarski, Analiza Matematyczna w zadaniach, Część I, II, PWN
3. Izabela Foltyńska, Zbigniew Ratajczak, Zdzisław Szafrański, Matematyka dla studentów uczelni technicznych. Część I, II, Wydawca: Wydawnictwo Politechniki Poznańskiej

Additional:
1. E. Karaśkiewicz, Zarys teorii wektorów i tensorów, PWN

Breakdown of average student's workload

	Hours	ECTS
Total workload	200	8,00
Classes requiring direct contact with the teacher	107	4,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	93	3,50