Level: bachelor

Course title: Mathematics I

Status: obligatory

ECTS: 8

Requirements: none

Learning objectives

The aim of the course is to enable students to apply advanced mathematical knowledge from linear algebra, functions and integrals in physics.

Learning outcomes

After taking the course, the student should have developed:

General abilities: basic knowledge of this field, following the literature, analysis of various solutions and the choice of the most adequate solution, application in practice and other subjects.

Subject-specific capabilities: student will be able to overcome difficulties caused by transition from elementary to advance mathematical thinking, and to continue with accepting limits processes and other contents in advance mathematics, applying mathematical modelling process on the physical problems.

Syllabus

Theoretical instruction

- The field of real numbers. The principle of mathematical induction. Binomial formula.
- Elements of linear algebra. Matrices, determinants, systems of linear equations, vectors, analytic geometry, equations for conic sections.
- Functions. Basic notions. Elementary functions: quadratic, rational, logarithmic, exponential and trigonometric functions as the mathematical models for real word problems.
- Limits and continuity. Sequences: notions and limits. Monotone sequences. Limits of functions-definition and properties, asymptotes . Continuity of a function, uniformly continuous functions.
- Derivative of a function. Definition and properties of the first derivative, differential of functions. Taylor - Maclaurin theorem. Examination and the graphs of functions.
- Indefinite integrals. Properties of indefinite integral. Change of variables. Integration by parts. Integration of rational and irrational function. Integration of trigonometric functions.
- Definite integral. Area problem. Definite integral. Properties of definite integral. Change of variables. Integration by parts. The applications of integral. Areas in the plane. Volumes. Lengths of curves. Surface area of revolution. Work.
- Mathematical modelling by using dynamic software.

Practical instruction

Problem solving.

Weekly teaching load				Other:
Lectures: 5	Exercises: 5	Other forms of teaching:	Student research:	