Mathematics B/1

(PMKMANE005A, 2 lectures/ 2 practice classes/ 0 lab, 5 credits)

(2016/17/1)

# 1. Aims of the course

Students learn the basics of mathematics enabling them to interpret and understand engineering sciences and through solving elementary tasks they deepen their basic theoretical knowledge in the field of engineering.

# 2. General requirements

Writing two tests during the study period of the term.

# 3. Short description

Sets, operations with sets. Sets of numbers. Vectors and operations with vectors. Definition of functions. Sequences and series of real numbers. Properties of functions of one variable, limit and continuity of functions. Elementary functions. Differential calculus of functions of one variable, analysis of functions.

# 4. Methodology

The presentations give an introduction to important mathematical techniques. Students solve exercises alone and with the teacher on the practice sessions.

# 5. Requirements

Requirements in the study period of the term (for a signature about fulfilling the entry requirements to the exam). Participation in the classes is required according to the rules about studies and exams at the university. 2 tests are to be written in the study period (6th and 12th weeks). Signature is given to students if they reach 40% of the available marks at the two tests in total. Otherwise, they can correct their previous result by writing a third test, covering the previous topics, in the first week of the exam period.

Requirements in the exam period (conditions for passing the exam): only those who have a signature can take an exam. Form of the exam: written test. Final grade in the subject will be given based on the average of total marks gained on the two tests in the study period and the marks gained in the exam. (Average between 40-55%: grade 2; between 56-70%: grade 3; between 71-85%: grade 4; between 86-100%: grade 5; failed below 40%.)

# 6. Programme of the lectures

1st week: Real numbers, sets and operations with sets; basic concepts: definition, theory, proof, symbols of mathematics.

2nd week: Definition of functions, presentation of elementary functions, operations on functions.

3rd week: Vectors and operations with vectors, scalar product.

4th week: Linear independence, basis, vectorial product.

5th week: Sequences of real numbers, subsequences, boundedness, monotonicity; convergence, divergence.

6th week: 1st test.

7th week: Limit and continuity of functions.

8th week: Polynomials, algebraic functions; inverse function; classifying functions.

9th week: Fall holiday.

10th week: Logarithmic and exponential function, trigonometric functions and their inverses.

11th week: Difference quotient, derivative; rules of differentiation, derivatives of elementary functions.

12th week: 2nd test.

13th week: Relations between differentiability and continuity; analysis of functions (monotonicity, extrema, convexity, inflections).

14th week: Analysis of functions, continued.

15th week: Solving exercises using differentiation.

# 7. Programme of the practice sessions

Exercises in the topics of each lecture listed above.