Course description

Mathematics

GKNB_MSTA012

Teacher: Pestiné Rácz, Éva PhD **Semester:** 2019/20/1

Teaching hours (per week): 2/2/0

Credits: 4

Prerequisite(s): -

Objective

Mathematics is essential for understanding biological and physical and optimization problems connected to agriculture and food production. Mathematics course provide all the basic mathematical background students need for they technical courses. Mathematics improves students' knowledge about sets and single variable functions, practices calculations with percentages and continuously changing amounts. At the end of the first semester students will not only be able to calculate limits of sequences and functions, derivative of functions, definite and indefinite integral of elementary functions, but apply these techniques to some practical problems such as curve sketching or calculation of areas.

Schedule

Week 1	Sets, determination of sets, operations on sets (union, intersection, complement and difference), Venn diagram
Week 2	Calculations with percentages, discrete models of population growth.
Week 3	Functions of a single variable. Domain and range of a function. Inverse function. Monotonicity of functions. Extremal values.
Week 4	Elementary functions (linear, power, rational, exponential, and logarithmic), their basic features, graphs and linear transformations.
Week 5	Composition of functions. Structure, domain and inverse of composite functions.
Week 6	Sequences and series. Definition of sequences, bounds and monotonicity. The geometric series.
Week 7	Limit of sequences. The number e. *Test 1.*
Week 8	Limits and continuity of functions. Reading limits from the graph of the function. Calculating of limits. One-sided limits. Limit at infinity.
Week 9	Definition of derivative of a function. Geometric meaning of derivation and the equation of the tangent of a function at a given point. Linear approximation.
Week 10.	Derivatives of elementary functions. Calculation of derivative of different functions (product, fraction and composite of functions).

Week 11.	Applications of the derivative. Determination of intervals, where the function is increasing or decreasing, finding local extrema. Application of derivative in maximum-minimum problems.
Week 12.	Definition of indefinite and definite integrals. The Newton–Leibniz formula. Integral of elementary functions.
Week 13.	Basic techniques of integration. Integration of linearly transformed functions. *Test 2*.
Week 14.	Summary and repetition. *Repetition test.*

Requirements and Assessment

Attendance of lectures and practicals are highly recommended.

The *signature* is the prerequisite of participation in exams. For the signature, students are required to satisfy the following conditions:

> getting at least 6 points from the tests (First test (max 6. points) + Second test (max. 6 points), or 6 points from the Repetition test (max. 12)

Those students, who got signature are allowed to take the exam during the exam period. Final mark will be given based on the result of this written test:

100-86 points: 5

85-71 points: 4

70- 61 points: 3

60-51 points: 2

0-50 points: 1.

Recommended reading(s): Selected chapters from:

Briggs et. al. (2013): Calculus for Scientists and Engineers. Pearson.

Disclamer

Who missed topics from high school mathematics, may need extra consultations and practice to complete this course.