

Syllabus:BE5B01MA1 Calculus 1

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Office:Zikova 4, 2nd floor, room n.14.

Text: M.Demlova & J.Hamhalter: Calculus I, CVUT, Praha, 1994.
P.Ptak:Calculus II. CVUT, Praha, 1997
<http://math.feld.cvut.cz/habala/teaching/em1.htm>

Course description: This is an introductory course to calculus of functions of one variable. It will start with limits and continuity of functions, derivative and its properties, graphing. Then it will cover indefinite and definite integrals, basic integration methods. At the end an introduction to sequences and series.

Lectures will cover all the material needed to pass the exam. Attendance is not obligatory but highly recommended. Students are encouraged to study material covered in the lectures before attending the lab.

Labs are devoted to develop the necessary technical skills for problem solving. The student is required to actively participate in the solution of the posed problems in front of the class. During the labs of Week 6 and Week 11 a test (45 min., 3 questions) will also be handed out. **Attendance is obligatory:** In order to obtain the certificate of attendance (needed for the final exam), students are required to actively participate in the laboratory class, hand in the assigned homework and obtain a sufficient score (at least 9 points out of 20) during lab tests. If the score obtained in a test is not sufficient, extra homework will be assigned and the test will be repeated at the end of the course.

Exam. The exam is composed of written and oral part.

The written final exam will be in January-February, exact dates will be announced later, it will consist of six problems (one about theory) to be solved in 90 minutes.

The oral final exam is optional, it is used to improve the grade up to ten points. Questions about theory will be asked (definitions, theorems, proofs). In order to pass the exam a minimum of 50 points in the written test is required, students with more then 60 points in the written part of the exam will be allowed to improve their grade with the oral part of the exam.

Grades are assigned as follows: F(<49pts), E(50-59), D(60-69), C(70-79), B(80-89), A(90-100).

Content of lectures.

(week 1) The real line, elementary functions and their graphs, shifting and scaling.

(week 2) Limits and continuity, tangent, velocity, rate of change.

(week 3) Derivative of functions, properties and applications.

(week 4) Mean value theorem, L'Hospital's rule.

(week 5) Higher derivatives, Taylor polynomial.

(week 6) Local and global extrema, graphing of functions.

(week 7) Indefinite integral, basic integration methods.

(week 8) Integration of rational functions, more techniques of integration.

(week 9) Definite integral, definition and properties, Fundamental Theorems of Calculus.

(week 10) Improper integrals, tests for convergence. Mean value Theorem for integrals, applications.

(week 11) Sequences of real numbers, numerical series, tests for convergence.

(week 12) Power series, uniform convergence, the Weierstrass test.

(week 13) Taylor and Maclaurin series.