**Syllabus: AE0B01MA1 Introduction to Calculus / AE3B01MA1 Mathematics 1**

**Instructor:** Paola Vivi,   e-mail:vivi@math.feld.cvut.cz   http://math.feld.cvut.cz/vivi/
Office: Zikova 4, 2nd floor, room n.14.

**Text:** M.Demlova & J.Hamhalter: Calculus I, CVUT, Praha, 1994.
P.Pták: Calculus II. CVUT, Praha, 1997
http://math.feld.cvut.cz/habala/teaching/veci-ma1.htm
http://math.feld.cvut.cz/habala/teaching/veci-ODE/em2notes.pdf (pages 13 to 17)

**Course description:** It is an introductory course to calculus of functions of one variable. It starts with limit and continuity of functions, derivative and its geometrical meaning and properties, graphing of functions. Then it covers indefinite integral, basic integration methods and integrating rational functions, definite integral and its applications. It concludes with an introduction to solving ordinary differential equations with the use of Laplace transform.

**Lectures** will cover all the material needed to pass the exam. Attendance is not obligatory but highly recommended.

**Labs** are devoted to develop the necessary technical skills for problem solving. 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 during lab tests.

**Exam.** Students who obtain attendance certificate ("zapocet") are allowed to take the 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 for a total of 90 points. 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) Elementary functions, limits and continuity.

(week 2) Derivative of functions, properties and applications.

(week 3) Mean value theorem, L'Hopital's rule.

(week 4) Limit of sequences. Taylor polynomial.

(week 5) Local and global extrema, graphing of functions.

(week 6) Indefinite integral, basic integration methods.

(week 7) Integration of rational functions by partial fractions, more techniques of integration.

(week 8) Definite integral, definition and properties, Fundamental Theorems of Calculus.

(week 9) Application of integrals, areas, volumes, lengths.

(week 10) Improper integrals.

(week 11) Laplace transform.

(week 12) Basic properties of direct and inverse Laplace transform.

(week 13) Using Laplace transform to solve differential equations.