201.1.9811. CALCULUS 1 FOR ELECTRIC ENGINEERING. BGU, SPRING 2015.

Site of the course: *www.math.bgu.ac.il/* $\sim$ *kernerdm*

Lectures (D.Kerner): Sun (10:00-12:00, [35], 1), Wed (17:00-19:00, [26], 4)

Tutorials (M.Rapaport): Mon (8:00-10:00, [90], 244), Tues (8:00-10:00, [28], 106), Tues (10:00-12:00, [90], 141)

Syllabus

(1) Basics about the sets. Rational numbers. Real numbers. Min/max and sup/inf. Number sequences and their limits. The number e. Generalized limits. Subsequences and partial limits. Cantor Lemma. Bolzano-Weierstrass thm. Cauchy criterion for convergence.
(2) Functions of one variable. Limits of functions. (Definitions of Heine and Cauchy.) Limits $\frac{sin(x)}{x}$ and $(1+\frac{1}{x})^x$. Continuity of elementary functions.
Properties of continuous functions. (Rolle theorem. Mean value thm. Weierstrass theorem) Basics on the uniform continuity. Cantor's theorem.
(3) Derivatives. Tangent line to the graph. Differential/change of functions Chain rule. Derivative of the inverse function. Derivatives of e^x, $sin(x)$, x^a, $ln(x)$, $arcsin(x)$, $arctan(x)$. One sided derivatives. Properties of differentiable functions. (Theorems of Roll, Lagrange, Cauchy.) l'Hôpital's rule. Higher derivatives. Taylor's formula. Taylor expansions of the functions e^x, $sin(x)$, $cos(x)$, $ln(1+x)$, $(1+x)^p$.
(4) Extrema of functions. Convexity/concavity. Investigation of functions. Sketching their graphs.
(5) Primitive functions and indefinite integral. Integration methods.
(6) Definite integral as a limit of Riemann sums.
(7) Polar coordinates. Applications of the definite integral: area of a planar figure, volume of a rotation body, length of a curve. Improper integral (on unbounded intervals and of unbounded functions).

Literature

(1) T.M. Apostol, Calculus, Vol 1, New York Blaisdell Pub. Co, 1961
(2) B.P.Demidovich, Problems in mathematical analysis. Gordon and Breach, Science Publishers, New York-London-Paris 1969 496 pp
(3) N. Kravitsky, S. Zaafrani, Calculus B1 (ex.) part 1 and 2, Ben Gurion University

Structure and the final grade

The homework submission is obligatory, it is 5% of the final grade.
There will be one midterm, (magen 10%), the date: 14.05.2015
The final exams are: Moed A (July 5) , Moed B (??).
There will be about 14 homeworks.
The final mark is computed as: $95\% \cdot max\Big\{(\text{final exam}), 10\%(\text{midterm})+90\%(\text{final exam})\Big\}+5\%(homeworks)$.