

## The Department of Mathematics

2019–20–A term

**Course Name** Calculus 1 for Computer Science and Software Engineering

**Course Number** 201.1.2361

**Course web page**

<https://math.bgu.ac.il/en/teaching/fall2020/courses/calculus-1-for-computer-sci>

**Office Hours** <https://math.bgu.ac.il/en/teaching/hours>

### Abstract

### Requirements and grading<sup>1</sup>

### Course topics

The system of the real numbers (without Dedekind cuts). The supremum axiom. Convergent sequences, subsequences, monotonic sequences, upper and lower limits. Series: partial sums, convergent and divergent series, examples, nonnegative series, the root test, the quotient test, general series, Dirichlet, Leibnitz, absolute convergence implies convergence (without a proof). Limits of functions, continuity, the continuity of the elementary functions, extrema in compact intervals. The derivative of a function, Lagrange's Mean Value Theorem, high order derivatives, L'hospital's rules, Taylor's Theorem, error estimates, lots of examples. The Riemann integral: only for piecewise continuous functions (finitely many points of discontinuity). Riemann sums and the definition of the integral, The Fundamental Theorem of Calculus, the existence of primitive functions (anti-derivatives). Integration techniques: integration by parts, substitutions, partial fractions (without proofs), improper integrals, applications of integrals, estimation of series with the aid of integrals, Hardy's symbols  $O$ ,  $o$  and  $\Omega$ , approximation of momenta and the Stirling formula.

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<sup>1</sup>Information may change during the first two weeks of the term. Please consult the webpage for updates