



## **Differential and Integral Calculus**

**Spring Semester**

### **LECTURER**

**Dr. Yaacov Yakubov**

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### **INSTRUCTOR**

**Michael Bromberg**

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### **COURSE DESCRIPTION**

#### **COURSE TOPICS**

Week 1-2: Limits: definition of limit of infinite sequences, Cauchy condition, limit of monotone sequences, divergence, uniqueness of the limit, the sandwich theorem, subsequences, Bolzano-Weierstrass theorem.

Week 3-4: Infinite series, convergence and divergence of series, convergence tests of series. Absolute and conditional convergence. Improper integrals, Euler gamma-function, comparison and integral tests.

Week 5-6: Power series: Cauchy-Hadamard theorem, differentiation and integration, multiplication of power series, Taylor and McLaurin series, Taylor and McLaurin series of elementary functions.

Week 7-8: Convergence of sequences and series of functions, uniform convergence, Weierstrass theorem, changing of limit (sum) and integral, changing of limit (sum) and derivative.

Week 9-10: Limit and continuity of functions of two variables, iterated limits, partial derivatives, the chain rule, changing the order of differentiation, implicit functions and their derivatives. Taylor formula, extremum, Lagrange multiplier method.

Week 11-12: Double and triple integrals, variables changing in double and triple integrals, Jacobian. Polar, cylindrical, and spherical coordinates. Surface integrals.

Week 13-14: Theory of vector fields, theorems of Green, Gauss, and Stokes. binomial series. Application of Taylor's formula to sufficient condition of an extremum. Investigation of a function.

### **ASSIGNMENTS**

75% of all homework assignments must be handed in for evaluation

### **MIDTERM COURSE POLICY**

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A midterm exam will be scheduled in the beginning of the semester. During an examination, student shall not use books, papers, or other materials not authorized by the instructor. The midterm will count for 10% of the total course grade.

### **FINAL COURSE POLICY**

The final exam will cover the entire course material and will count for 90% of the total course grade. There will be a choice of 4 out of 5 questions, where question 2 is obligated. The duration will be 3 hours. During an examination, student shall not use books, papers, or other materials not authorized by the instructor.

Students will have a first exam, Moed A. If the student does not pass, they can retake the exam, Moed B. The last exam taken will be the student's final grade for the exam.

### **REQUIRED READING**

Protter and Morrey: *A first Course in Real Analysis*, UTM Series, Springer-Verlag, 1991.

### **ADDITIONAL READING**

Thomas and Finney, *Calculus and Analytic Geometry*, 9<sup>th</sup> edition, Addison-Wesley, 1996.