Math 22b – Honors Multivariable Calculus
Information for students, Spring 2019

Class meets at: Goldsmithy 117, MW 2–3:50 PM

Lecturer: Dmitry Kleinbock, office: Goldsmith 207, phone 6-3059;
office hours: Tue afternoon (more precisely TBA);
e-mail address: kleinboc@brandeis.edu

Grader: TBA

This course is an honors version of Math 20b, that is, it is more proofs-oriented and requires more class time. The goal is to extend all that you know about single-variable calculus to functions between finite dimensional vector spaces. Linear algebra is a prerequisite; students who took Math 15a but are interested in proofs are welcome to join!

Text: Vector Calculus, by Jerrold E. Marsden and Anthony Tromba. We will be using the 6th edition, which is available at the bookstore. The book has the companion web site: https://www.macmillanlearning.com/Catalog/studentresources/marsdenvc6e, containing additional material, some of which we will be going through in class.

Topics to be covered include:
- Functions of several variables and their derivatives
- Extrema problems for scalar-valued functions
- Vector-valued functions and their linear approximations
- Multiple integration
- Vector integrals, Stokes’ theorem

Students are assumed to be proficient in the techniques in calculus of one variable (Math 10a & 10b, or their equivalent). They are also assumed to be thoroughly familiar with the topics in Chapter 1 of the textbook, which will be skipped.

Learning Goals for Math 22b. Students in Math 22b will: extend their knowledge of single-variable calculus to the multivariable set-up; study vector valued functions of several variables; define linear maps which play the role of derivatives of those functions; learn how to apply differential calculus to optimization problems in several variables; study integration of multivariable functions with applications to finding areas and volumes; study vector fields and discover a multi-dimensional generalization of the Fundamental Theorem of Calculus (Stokes’ theorem).

4-Credit Course. Success in this 4 credit hour course is based on the expectation that students will spend a minimum of 10 hours of study time per week in preparation for class (readings, homework, preparation for exams, etc.).
Grades will be computed as follows:

- Two midterm exams, in class, dates TBA = 40%
- The final exam, as scheduled by registrar = 45%
- Graded homework = 15%

The dates of the midterm exams will be announced in advance. Homework will be assigned once every one or two weeks and will be due the following week; the deadline for the first assignment is Wed 1/23. Most of the homework problems will be drawn from the textbook. Other parameters, such as class participation (answering or asking questions in class) and bonus points (for optional problems or exceptionally thoughtful analysis of tests/homework) will also affect the students’ performance. Late homework will be accepted with a 25% penalty, up to one week after the due date and before the solution has been posted. Homework submitted more than one week late or after the solution has been posted will not be accepted. Students who miss an exam will not be granted a make-up test unless there is a documented medical or other emergencies.

Policies: You may discuss the homework problems with your classmates; however, if you do, you should write on your homework submission the names of the classmates with whom you have discussed the assignment. You do not need to mention any help you have received from the instructor or the grader. You may not copy the written work of another student or from any other sources, or allow another student to copy your written work. What you submit should be your own work.

You should state the source of a mathematical fact you use when writing up your work, unless the fact you use is something you had learned earlier as part of your prerequisite for 22b. You can state the source by citing a theorem in the textbook, the page number of an exercise we have gone over in class or in a prior homework, or a fact we have proved in class. Both the instructor and the grader are available during their weekly office hours or by appointments. Students are encouraged to seek help from them on any course related matter.

Students with Disabilities: If you are a student with a documented disability on record at Brandeis University and wish to have a reasonable accommodation made for you in this class, please contact me immediately.

Academic Integrity: You are expected to be familiar with, and to follow, the University’s policies on academic integrity. Please consult Brandeis University Rights and Responsibilities for all policies and procedures. All policies related to academic integrity apply to in-class and take home projects, assignments, exams, and quizzes. Students may only collaborate on assignments with my permission. Allegations of alleged academic dishonesty will be forwarded to the Director of Academic Integrity. Sanctions for academic dishonesty can include failing grades and/or suspension from the university.

Have a great semester!