MATH 141A FALL 2018

Real Analysis

Lecturer: Dmitry Kleinbock e-mail: kleinboc@brandeis.edu

Class will meet at: TTh 2:00 – 3:20 PM in Room 226.

First meeting: Th Aug 30

Suggested textbooks:

• *Real and Functional Analysis* by S. Lang (Springer)
• *Real and Complex Analysis* by W. Rudin (McGraw-Hill)
• *Introductory Real Analysis* by A. Kolmogorov and S. Fomin (Dover)

This is a graduate course, and thus it assumes some background in undergraduate real analysis as a prerequisite. This includes basics on topological and metric spaces (compactness, completeness, etc), which will be reviewed at the beginning of the class.

Tentative list of topics to be covered:

• Banach and Hilbert spaces, linear functionals, linear operators
• abstract measure theory and integration, Lebesgue integral on $\mathbb{R}^n$
• $L^p$ spaces, duality (Radon-Nikodym)
• measures as functionals (Riesz representation)
• more analysis on $\mathbb{R}^n$: convolution, Fourier transform
• other topics – if time permits

Homework will be assigned once every one or two weeks and will be due the following week. At the end of the course there will be a take-home final exam.

Learning Goals for Math 141a. Students in Math 141a will study examples and properties of Banach and Hilbert spaces; learn proofs of basic theorems of functional analysis, measure theory and integration; construct Lebesgue measure on $\mathbb{R}^n$; get introduced to basic notions of harmonic analysis on $\mathbb{R}^n$ such as convolution and Fourier transform.

4-Credit Course. Success in this 4 credit hour course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, homework, preparation for exams, etc.).

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 see 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!