Math-501 Analysis I

Instructor: Turgay Bayraktar

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Office: FENS 1013 **Office Hours:** M 9.40am-10.30am or by appointment.

Textbook: R. L. Wheeden, A. Zygmund, Measure and integral. An introduction to real analysis, 2nd ed. (2015) Taylor & Francis Group, LLC.

Supplementary Reading:

1. W. Rudin, Real and complex analysis. Third edition. McGraw-Hill Book Co., New York, 1987. xiv+416 pp. ISBN: 0-07-054234-1
2. T. Tao, An introduction to measure theory. Graduate Studies in Mathematics, vol. 126. ISBN-10: 0-8218-6919-1
3. G. B. Folland, Real Analysis: Modern Techniques and Their Applications. Second Addition, Wiley, ISBN-10: 0471317160

Phisacal Lectures: Wed 11.40am-13.30 FENS L055 & Thurs 13.40-14.30 FENS L055
Zoom link: `https://sabanciuniv.zoom.us/j/97410931016`

Content: Lebesgue measure and integration on the line. Integral convergence theorems. General measure theory and integration. Abstract L^p spaces. Decomposition of measures. Radon-Nikodym theorem. Product measures and Fubini's theorem.

Course Policies: Lecture can be followed either physically in class or online over zoom. Students are free to choose one of these cases. However, attendance for both cases is expected and strongly encouraged. You are responsible for lecture notes, any course material handed out in class. No cell phones nor pagers are allowed during the lectures. I strongly encourage active participation in the classroom. This way I can clarify the difficulties that you have about the course material.

Grading Policy: There will be bi-weekly homework sets (approximately 5-6 assignments in total) (30%), two in class Midterm exams (30%), participation and an oral exam is worth (10%). The schedule of these exams will be announced on the course website.

Homework: Homework assignments are based on the weeks lectures and will be posted on the SU-course website sometime on Thursday. That assignment will be due in two week on Thursday at the beginning of the lecture. You are encouraged to do your homework in groups. You are required, however, to write up your homework on your own. Homework is an essential educational part of this course. Your work will be graded mostly on your ability to work problems on exams. You cannot work problems on midterm exams if you have not practiced the techniques within the

homework problems. If you misuse homework by not doing it yourself, or not checking that you can solve a problem on your own after having been shown how to do it, then your exam scores and corresponding grade will reflect this.

Academic Honesty: The strength of the university depends on academic and personal integrity. In this course, you must be honest and truthful. Cheating hurts our community by undermining academic integrity, creating mistrust, and fostering unfair competition. The university will punish cheaters with failure on an assignment, failure in a course, permanent transcript notation, suspension, and/or expulsion.

Violations can include cheating on exams, plagiarism, reuse of assignments without permission, improper use of the Internet and electronic devices unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition. Ignorance of these rules is not an excuse.

In this course, as in many math courses, working in groups to study particular problems and discuss theory is strongly encouraged. Your ability to talk mathematics is of particular importance to your general understanding of mathematics.

You should collaborate with other students in this course on the general construction of homework assignment problems. However, you must write up the solutions to these homework problems individually and separately. If there is any question as to what this statement means, please see the professor or the recitation instructor.

For more information, see the guide on the SU website (`http://mysu.sabanciuniv.edu/yonerge/Akademik_durustluk/E-Investigation.html`).

Tentative course schedule

Date	Sections
Week 1	Topology of $\mathbb{R}^n$ and Review of Riemann Integral
Week 2	Riemann-Stietjes Integral
Week 3	Lebesgue Measure and Outer Measure
Week 4	Lebesgue Measure and Outer Measure Cont.
Week 5	Lebesgue Measurable Functions
Week 6	Theorems of Egorov and Lusin
Week 7	Lebesgue Integral
Week 8	Fubini's and Tonelli's Theorems
Week 9	Lebesgues Differentiation Theorem
Week 10	Lebesgue L^p Spaces
Week 11	Abstract measure and integration
Week 12	Relative Differentiation of Measures: Radon-Nikodym Theorem
Week 13	Abstract L^p spaces
Week 14	Review