Math 533 - Spring 2025

Real Analysis II

Course Syllabus

Lecturer: **Dror Varolin**

Office	4-111 Math Tower
Office Hrs	Mon 12:00pm-1:30pm, Thu 12pm-1:30pm or by appointment
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Prerequisites: Introductory graduate courses in real and complex analysis, or permission from both the instructor and the Stony Brook Mathematics Graduate Director, Raanan Schul, whom you can email at raanan.schul@stonybrook.edu.

Text: Real Analysis: Modern Techniques and Theori Applications
by Gerald B. Folland.
The text will be supplemented by notes of the instructor.

Course webpage: http://www.math.stonybrook.edu/~dror/533-s25.html

Holidays: Holidays are listed in the university calendar. See
http://www.stonybrook.edu/registrar/index.shtml

Homework: There will be weekly problem sets, except for the week of the midterm, the week of Spring Break and the last week.

Examinations: There will be one midterm and one final exam.

Grade Distribution:

Problem Sets: 60%, Midterm: 20%, Final: 20%.

If your grade on the Final grade is better than your average grade, you get the Final grade.

You are encouraged to discuss problem sets with other students in the class, but everyone must write up their own solutions, and different people's solutions should not look identical.

The topics to be covered are as follows.

1. Point Set Topology
   a. Review of basics. Directed sets and nets
   b. Compactness
   c. The Arzelá-Ascoli Compactness Theorem
   d. The Stone-Weierstrass Theorem
2. Functional analysis
   a. Normed Vector Spaces
   b. Linear functionals, Hahn-Banach theorem
   c. Baire Category theorem, open mapping theorem, closed graph theorem, Uniform Boundedness Principle
   d. Topological vector spaces, duality, weak and weak* convergence, Alaoglu's theorem
   e. Hilbert spaces
3. L^p spaces (completing only what was omitted Real Analysis I)
4. Ordinary differential equations
5. Radon measures on locally compact Hausdorff spaces
6. Elements of Fourier Analysis
   a. Fourier Transform on $\mathbb{R}^n$ and the circle
   b. Riemann Lebesgue lemma, Hausdorff-Young inequality, Plancharel, Poisson summation, $L^2(\mathbb{R}^n)$
   c. Summation and convergence theorems
7. Distributions

Student Accessibility Support Center Statement

If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Academic Integrity Statement

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website
http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Student Conduct and Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Until/unless the latest COVID guidance is explicitly amended by SBU, during Fall 2021"disruptive behavior" will include refusal to wear a mask during classes.