

MAT 532: REAL ANALYSIS I

FALL 2019

STONY BROOK MATHEMATICS DEPARTMENT

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Course Content.

MAT 532 is the SBU Mathematics first course in Real Analysis. This is one of the so-called *Core Courses*, and therefore consists of basic material that every PhD Candidate at Stony Brook Math is expected to know. The Core Courses are listed at the url

<http://www.math.stonybrook.edu/graduate-core-courses>

This course will cover the following topics.

(1) **Measures**

- (a) σ -algebras
- (b) Measures
- (c) Outer measures
- (d) Borel Measures

(2) **Integration**

- (a) Measurable Functions
- (b) Integration of Nonnegative Functions
- (c) Integration of Complex Functions
- (d) Modes of Convergence
- (e) Product Measures
- (f) The n -dimensional Lebesgue Measure
- (g) Integration in Polar Coordinates

(3) **Signed Measures and Differentiation**

- (a) Signed Measures
- (b) The Lebesgue-Radon-Nikodym Theorem
- (c) Complex Measures
- (d) Differentiation in Euclidean Space
- (e) Functions of Bounded Variation

(4) **Introduction to L^p Spaces**

- (a) Basic Theory of L^p spaces
- (b) The dual of L^p

Required Reading.

The text for the course is the second edition (which is also most current) of the book

Real Analysis Modern Techniques and Their Applications

by Gerald B. Folland.

The material mentioned on Page 1 will be covered in lectures, but it is impossible to cover everything in the book. Nevertheless, students taking the course are responsible for the all of the aforementioned material, not to mention that it is generally advisable to have seen the material before it is lectured on.

A weekly reading assignment will be provided on the course website, at the link
<http://www.math.stonybrook.edu/~dror/532-f19-Reading.html>

Exam Schedule. There will be two midterms and a final exam in the course.

Students that score sufficiently well in the two midterms may be exempt from the final.

The dates for the midterms are

Midterm I	Tuesday, Oct 22, 1pm-2:20pm
Midterm II	Thursday, Dec 5, 1pm-2:20pm
Final Exam	Thursday, Dec 19, 11:15am – 1:45pm

Problem Sets. A weekly problem set will be assigned. All of the problems come from the text, and the problem sets along with their due dates will be listed at the link

<http://www.math.stonybrook.edu/~dror/532-f19-Homework.html>

They are listed below for your convenience, but without the due date.

Problem Set #	Problems (Chapter.Number)	Due Date
1	1.2, 1.4, 1.5	
2	1.6, 1.8, 1.9, 1.10, 1.11, 1.12	
3	1.17, 1.18, 1.20	
4	1.26,, 1.27, 1.29, 1.30, 1.32	
5	2.3, 2.8, 2.9, 2.10, 2.12, 2.14	
6	2.19, 2.23, 2.25, 2.26	
7	2.33, 2.34, 2.39, 2.40, 2.44	
8	2.48, 2.49, 2.50, 2.54	
9	3.1, 3.2, 3.3, 3.7	
10	3.8, 3.9, 3.17	
11	3.22, 3.23, 3.25	
12	3.30, 3.37, 3.38, 3.40, 3.42	
13	6.1, 6.2, 6.3, 6.5, 6.7, 6.13, 6.17, 6.18	

Required Syllabus Statements.

- Americans with Disabilities Act. If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC(Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information go to the following web site:

<http://www.ehs.sunysb.edu>

and search Fire Safety and Evacuation and Disabilities.

- Academic Integrity 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 are 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 at

<http://www.stonybrook.edu/uaa/academicjudiciary/>.

- 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 University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook. See more policies at

<http://www.stonybrook.edu/commcms/provost/policies.shtml>