

Math 3510 – 1 Introduction to Real Analysis February 7, 2017

Credit Hours: Four

Meeting Time: MTWF 2:00 – 2:50 pM in LCB 219.

Homepage: <http://www.math.utah.edu/~treiberg/M5210.html>

Instructor: Prof. A. Treibergs, JWB 224, 581 – 8350.  
Office Hours: MWF 11:45 – 12:45 PM (tent.) & by appt.  
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Prerequisites: "C" or better in MATH 3220

Text: Robert S. Strichartz, The Way of Analysis, revised ed.,  
Jones & Bartlett, Pub., Sudbury MA, 2000.

#### Course Description:

This is a semester course devoted to real analysis. We'll build on topics from Math 3210–20 such as properties of real numbers, topology, sequences, continuous functions, derivatives, Riemann integral. We'll construct the real numbers. Many models from mathematical physics and mathematical biology reduce to differential equations, whose analysis depends on the study of function spaces that abstract the real number spaces. Finally, we'll develop the powerful Lebesgue integral. I will probably supplement the text with material from Royden's Real Analysis.

Topics: We will cover most or all of the following chapters

- Chapter 2 – Review Real Numbers
- Chapter 9 – Metric Spaces
- Chapter 7 – Applications
- Chapter 10 – Various Applications, such as
- Chapter 11 – Differential Equations
- Chapter 12 – Fourier Series
- Chapter 13 – Implicit Functions
- Chapter 14 – Lebesgue Integral
- Chapter 15 – Multiple Integrals

#### Expected Learning Outcomes:

Upon successful completion of Math 5210 – Introduction to Real Analysis, students will be able to: construct the real numbers; manipulate basic topological notions such as open closed, compact, connected sets and how these notions extend to function spaces; show familiarity with limiting processes such as convergence, derivative, Riemann integral; and be able to construct and handle the Lebesgue integral. Students will be able to use analytical methods for such applications as to differential equations, Fourier Series and implicit surfaces. Students show an appropriately more sophisticated proficiency in writing proofs and making a mathematical argument.

#### Teaching and Learning Methods:

Material will be presented in lectures and read from the text and other sources. Students will solidify their learning by solving problems assigned weekly. Students will ask questions and present solutions in regular classroom discussions. Students may benefit from one-on-one instruction by consulting the instructor during office hours.

## Evaluation Methods and Grading

**Homework:** To be assigned weekly.

Homework will be due Fridays and will be collected in class. Papers turned into my mailbox in the math mail room (JWB 228) by 4:00 PM Fridays will be regarded as being turned in on time. Homework that is late but not more than one week late will receive half credit. Homework that is more than one week late will receive no credit at all.

**Exams:** Exams will be closed book except that you may bring a "cheat sheet," an 8.5" x 11" piece of paper with notes on both sides. Your text, notes, homework papers, calculators laptops, tablets, phones, text messaging devices, and other books will not be allowed.

**Midterms:** There will be two in-class one-hour midterm exams on Wednesdays Feb. 8, Mar. 29.

**Final Exam:** Wed., May 1, 1:00 – 3:00 pm. Half of the final will be devoted to material covered after the second midterm exam. The other half will be comprehensive. Students must take the final to pass the course.

**Course grade:** Best two of two midterms 40% + HW 30% + final 30%. Grades will be assigned "on the curve."

**Withdrawals:** Last day to register is Jan.13. Last day to drop class is Jan 20. Until Mar. 3 you can withdraw from class with no approval at all. After that date you must petition your dean's office to be allowed to withdraw.

**ADA:** The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in this class, reasonable prior notice needs to be given the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations. All information in this course can be made available in alternate format with prior notification to the Center for Disability Services ([www.hr.utah.edu/oeo/ada/guide/faculty/](http://www.hr.utah.edu/oeo/ada/guide/faculty/))

### Faculty and Student Responsibilities:

All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student handbook. Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, plagiarism and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to the Faculty Rules and Regulations, it is faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee. Faculty must strive in the classroom to maintain a climate conducive to thinking and learning (PPM 6-316). Students have a right to support and assistance from the University in maintaining a climate conducive to thinking and learning (PPM 6-400).

**Note:** The syllabus is not a binding legal contract. It may be modified by the instructor when the student is given reasonable notice of the modification.