Syllabus for Math 1010: Analysis – Spring 2017

Instructor
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Texts
• Main book: “Understanding Analysis” (2nd edition) by Stephen Abbott
  Available online through the library at https://search.library.brown.edu/catalog/b7628404.
  An affordable printed copy can be obtained through the same link.
• Supplementary book: “Analysis 1” (3rd edition) by Terence Tao
  Available online through the library at https://search.library.brown.edu/catalog/b7828581.

Topics and Learning Goals
We plan to cover the following topics, mostly in this order:
• Basics on Logic, Set Theory, Functions and Relations
• The Real Numbers \( \mathbb{R} \): Construction, Completeness and Cardinality
• Sequences: Limits, Convergence, Bolzano-Weierstrass Theorem, Cauchy Sequences
• Basic Point-Set Topology of \( \mathbb{R} \): Open, Closed, Compact and Connected Sets
• Limits of Functions and Continuity, Intermediate Value Theorem
• Derivatives, Mean Value Theorem
• Sequences and Series of Functions: Uniform Convergence, Power Series, Weierstrass Approximation
• Riemann Integration and the Fundamental Theorem of Calculus
• Additional Topics (time permitting): Fourier Series, Special Functions, Metric Spaces

Emphasis of the Course
For many students this course will be the first contact with rigorous mathematical thinking and proofs. It is one of the core goals to introduce, familiarize and ultimately equip students with this way of reasoning. Even the most basic, simple looking steps which one might have taken for granted will be under detailed scrutiny and it is crucially important that students go over all arguments in full detail. It goes without saying that this is a major undertaking and requires serious effort and dedication.

In short: In addition to the list of topics, a whole new way of thinking is thus at the core of the course and will be tested thoroughly.
Requirements and Grading

We will have weekly homeworks, quizzes in discussion section, a two-hour midterm and a three-hour final exam. Aids such as books, notes or calculators will not be allowed for the quizzes, midterm and final exam. The code of academic honesty applies.

The schedule of topics for each week will be posted online to allow you to prepare for class. In order to benefit the most, you should come to class having read the relevant chapters before they are covered in class. This includes going through examples in the sections to be discussed.

Please be aware that this course will proceed at a fast pace and that you cannot expect to be able to follow it without solid work, both during the class and discussion sections as well as on your own.

**Homework**  
A large part of the homework problems will be selected from the textbooks. Your weekly homework is due at the beginning of the first lecture of each week. You are encouraged to discuss the homework problems with your fellow students, but you must write up the assignments on your own. Please write legibly (including your name), staple all pages together, form clear sentences and circle your answers whenever appropriate.

**Quizzes**  
Over the course of the semester, four quizzes of 20 minutes each will be held in the discussion sections.

**Midterm Exam**  
Before Spring Recess we will have a two-hour midterm exam (the precise date will be specified later).

**Final Exam**  
The final exam will take place on May 13, 2017. It will take three hours.

**Grading**  
Your grade will be determined at the end of the term by weighting contributions from your work over the course of the semester in the following way:

- Homework (excluding your two lowest scores): 15%
- Quizzes: 15%
- Midterm Exam: 25%
- Final Exam: 45%

**Absences**  
You should inform me of any foreseeable conflict of schedule at least one week in advance. In the event of an inevitable absence from a quiz with legitimate reasons, a make-up quiz will be offered in the same week of the original quiz.

**Accommodations**  
Please inform me if you have a disability or other condition that might require accommodations or modification of any of the course procedures.

**Course-Related Work Expectations**

Over 14 weeks, students will spend 3 hours per week in class and 1 hour per week in discussion section (56 hours total). Homework and other out-of-class work is estimated at around 7 hours per week (154 hours total). In addition, we will hold four quizzes in recitation, for which a preparation time of one hour each is estimated. There will further be a 2-hour midterm exam and a 3-hour final exam, for which approximately 7 and 10 hours (respectively) of review are assumed (180 hours total).