MATH 3210 - FOUNDATIONS OF ANALYSIS
SPRING 2018

Instructor: Adam Boocher   **Email:** boocher@math.utah.edu   **Office:** JWB 315

Office Hours: After class MWF or by appointment.

Textbook: *Foundations of Analysis by Joseph Taylor.* Additional course materials will be posted on the website. Grades will be reported using Canvas.

Website: I'll post everything to Canvas.

Important Dates:

Midterm 1	Feb. 9	In class
Midterm 2	Mar. 16	In class
Final	April 30	8 am

Course Description: This course could be called "A proper study of the real number system." By proper, we mean that we'll be justifying (almost) everything that we state, including many things that were taken for granted in previous courses. We'll start with a study of number systems including a definition of the real numbers. We'll progress to sequences, series, and calculus of a single variable. Analysis is exciting in that we are frequently given a definition of a notion and then we get to see how the definition helps us prove things. Proofs will be essential in this course and we'll spend a good amount of time writing and re-writing them in this course. You should expect to work hard on homework problems most days of the week.

Course Objectives and Expected Learning Outcomes: At the end of this course, students will:

(1) Understand the differences between the natural numbers, integers, rational numbers and real numbers, and be able to prove basic statements about them.
(2) Understand the axioms of the real number system and have a big-picture understanding of how concepts in Calculus 1 can be proven.
(3) Be able to provide examples and non-examples illustrating various properties of sets and functions.
(4) Become comfortable with definitions as being precise mathematical statements and use them to prove statements.
(5) Write proofs using delta and epsilon and understand their meaning.
(6) Have increased fluency in the the language of mathematics.

Grading Policy: Your grade will be determined based on:
- Homework and Class Participation - 20%
- Weekly Quizzes - 20%
- 2 Midterms - 20% each
- Final - 20%

The material in this course will be very demanding and as such I won't follow firm grade cutoffs, but will allow for generous assignment of grades.

Homework and Quizzes serve as the best way to gain practice solving problems and writing up your solutions. The in-class quizzes will often involve definitions we have learned that week and help encourage mastery. I will drop the lowest quiz score, and no make-up quizzes will be given. The quizzes are worth 20% of your total grade, and should be taken seriously. They are the best way to get feedback as to how the course is going.

Homework will be assigned weekly. Sometimes I will require you to post something online on canvas, or send me an email with on a certain topic. This is meant to keep you engaged with the course and to guide you through some of the trickier definitions. You are encouraged to work on homework in groups, but please write up your solutions to each problem on your own. Getting practice writing proofs is the main purpose of the homework. In class we will spend some time

going over homework solutions - I will ask volunteers to present their solutions on the board so we can all learn from each other. The lowest homework score will be dropped.

Strategies for Success: This class will be challenging - you will learn some abstract definitions and will be required to have a deep understanding. You'll be asked to solve problems and the solutions will require creativity. This course is very much a language course as much as anything else. Developing fluency requires practice.

I find that daily practice is the best pathway to success in a number of areas - consider music, meditation, yoga, etc. Consider making a commitment to think about mathematics on your own each day. Most days this will mean working on the homework, or participating in discussion. But if you find yourself busy with life's other demands, even five minutes of thinking "What was it we did in class the other day?" will do wonders.

There will be no extra credit in this course, but notice that participation is a component of your grade. Success is very strongly correlated with effort, and I can promise that if you are struggling in this course then attending office hours as well as volunteering in class will be very useful to your understanding in the course.

Academic Integrity: All University of Utah policies regarding ethics and honorable behavior apply to this course.

Resources for you:

1.) ADA: The University of Utah is fully committed to affirmative action and to its policies of nondiscrimination and equal opportunity in all programs, activities, services, and employment without regard to race, color, national origin, sex, age, disability, gender identity/expression, religion, sexual orientation, and status as a protected veteran. The University seeks to provide equal access to its programs, services, and activities for people with disabilities. Reasonable prior notice is needed to arrange accommodations. Evidence of practices not consistent with these policies should be reported to the Universitys Title IX/ADA/Section 504 Coordinator: Director, Office of Equal Opportunity and Affirmative Action, 201 S Presidents Cr., Rm 135, Salt Lake City, UT 84112. 801-581-8365 (V/TDD).

2.) Wellness Center: Are you concerned about stress, sleep difficulties, anxiety, depression, cultural differences, relationship difficulties, balancing work and school, or finances? Would you like to perform better in class, help a friend in distress, or learn more about physical activity or nutrition? Contact the Center for Student Wellness; `wellness@sa.utah.edu`; `www.wellness.utah.edu`; 801-581-7776.

3.) Veterans: If you are a student veteran, I want you to know that the U of Utah has a Veterans Support Center on campus. Please visit their website for more information about what support they offer, a list of ongoing events and links to outside resources: `http://veteranscenter.utah.edu/`. Please also let me know if you need any additional support in this class for any reason.

4.) LGBTQ: If you are a member of the LGBTQ community, I want you to know that my classroom is a safe zone. Additionally, please know that the U of Utah has an LGBT Resource Center on campus. You can visit their website to find information about the support they can offer, a list of events through the center and links to additional resources: `http://lgbt.utah.edu/`. Please also let me know if you need any additional support in this class for any reason. My pronouns are (he/him/his) and please let me know if you have preferred pronouns.

5.) Mathcenter: There is free tutoring available at the Math Tutoring Center, located in room 155 of the T. Benny Rushing Mathematics Center (adjacent to the LCB and JWB). To let the tutors know that you need help, simply put up one of the flags. If you find that you'd prefer more personalized attention than our tutoring center can give, try the ASUU Tutoring Center (7 dollars an hour), 330 SSB, or pick up a private tutor list from the math department office (233 JWB). For more information look here: `http://www.math.utah.edu/ugrad/mathcenter.html`.