

Math 3210 Section 001: Foundations of Analysis

Spring 2020 Course Syllabus

Instructor: Josh Pollitz

Class Meetings: MWThF 9:40 – 10:30 AM in GC 5490

Email: pollitz@math.utah.edu

Office: JWB 209

Office Hours: I will hold *at least* two scheduled office hours per week. These will be set by Wednesday, January 8th, and will be announced in class as well as posted on Canvas; my office hours will be determined using the availability of the students in the course (please complete the following survey before the end of the day January 7th: <https://www.when2meet.com/?8512189-zYN3p>).

I am always happy to schedule additional office hours **by appointment**, please don't hesitate to ask!

Course Text: *Foundations of Analysis* by Joseph Taylor, American Mathematical Society, **ISBN-13:** 978-0821889848, **ISBN-10:** 0821889842

Prerequisites: C or better in at least one class in each of the following groups:

- **Group 1:** MATH 2210, MATH 1260, MATH 1280, MATH 1321, MATH 3140
- **Group 2:** MATH 2200, MATH 2270, MATH 2250

Course Description: According to the university course catalog:

“Logic, methods of proof and mathematical argument in mathematical analysis. Rigorous reconsideration of the real-number system, infinite series and of continuity, differentiation and integration for functions of one variable. The emphasis is on improving the student’s ability to understand and explain concepts in a logical and complete manner.”

This course could be called “a *proper* study of the real number system and the basics of calculus.” By *proper*, we mean that we will be justifying *nearly* everything that we state, including many things that were taken for granted in previous courses. We begin with a careful study of number systems including a definition of the real numbers. Next, we progress to sequences, series, and calculus of a single variable. Proofs will be essential in this course and we will 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 “ ϵ - δ arguments” and understand their meaning.
- (6) Have increased fluency in the the language of mathematics.

Grade Breakdown:

Exams (2)	35%
Final Exam	25%
Homework	25%
Quizzes	10%
Classwork & Participation	5%

Evaluation: Tentative grade scale:

A	100-93	B+	89-87	C+	79-77	D+	69-67	E	below 60
A-	92-90	B	86-83	C	76-73	D	66-63		
		B-	82-80	C-	72-70	D-	62-60		

Exams: There will be **two** 50-minute, in-class exams that are worth 35% of your final grade and there will be a final exam that is worth 25% of your final grade. All exams will be held in our usual meeting place, GC 5490.

Exam 1: Friday, February 7th

Exam 2: Friday, March 20th

Final Exam: Friday, April 24th, 8:00–10:00 AM

Graded Homework Assignments: Homework assignments will be due the following days:

Friday, January 17th Friday, February 21st Friday, April 3rd

Friday, January 31st Friday, March 6th Friday, April 17th

Homework can be turned in individually or in pairs. I would highly recommend that you try submitting assignments in pairs, as writing proofs with another can be an incredibly valuable learning experience. You can even type your homework up together on Overleaf: <https://www.overleaf.com>. I expect homework to be *very neatly hand-written* or typed (this is a great opportunity to learn/use LaTeX to type up these assignments). Points will be deducted from non-neatly, hand-written homework. Overall, your homework assignments will make up 25% of your final grade.

Quizzes: There will be quizzes on the following days:

Friday, January 10th Friday, February 14th Friday, March 27rd

Friday, January 24th Friday, February 28th Friday, April 10th

Each quiz will consist of 3-4 questions and you will be allotted 25-30 minutes. These are *group* quizzes and these will be completed in groups of 2-3. I will assign the groups for the first two quizzes but you will be able to form your own groups for the subsequent quizzes. The problems from the quiz will be from the *uncollected homework problems*, the in-class assignments and material from the lecture. There are no make-up quizzes unless you have a university excused absence, in which case, you must schedule a time to take the quiz before the quiz is administered. I will drop your lowest quiz score. Overall, your quizzes will constitute 10% of your final grade.

Classwork & Participation: There will be one *in-class* assignment per week. These will vary in length, typically one should expect one of these assignments to be 15-20 minutes in length. These will be completed in groups of 2-3 and their evaluation is based solely on effort/completion. I will excuse **2** missed class assignments. Also, I expect each student to present their solutions to problems and discuss mathematics. Each student will be responsible for 2 presentations. The in-class assignments constitute 3% of your final grade while the presentations constitute 2%. In total, the "classwork and participation" portion of your grade will make up 5% of your final grade.

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

ADA Statement: 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 the class, reasonable prior notice needs to be given to the Center for Disability and Access, 162 Olpin Union Building, 581-5020 (V/TDD). CDA will work with you and the instructor to make arrangements for accommodations. All information in this course can be made available in alternative format with prior notification to the Center for Disability and Access.

Tutoring: The Rushing Math Center offers free drop-in tutoring, a computer lab, and study areas for undergraduates. The Rushing Student Center is adjacent to the LCB and JWB buildings. If you find that you'd prefer more personalized attention than our tutoring center can give, try the ASUU Tutoring Center or pick up a private tutor list from the math department office (233 JWB). For more information look here: <http://learningcenter.utah.edu> and <http://www.math.utah.edu/ugrad/mathcenter.html>, respectively.

Campus Safety: The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu