

MATH S4061: INTRO TO MODERN ANALYSIS I  
Summer 2019  
Section 001

**Instructor:** Mitchell Faulk

**Time:** MTWR 10:45am-12:10pm

**Place:** TBA

**Office Hours:** TR: 1:00pm-2:00pm

**Teaching Assistant:** TBA

**Webpage:** <http://math.columbia.edu/~faulk/AnalysisSummer2019>

## Prerequisites

Multivariable Calculus and linear algebra, or the equivalent

## Description and goals

We plan to cover the first seven chapters of Rudin's *Principles of Mathematical Analysis* (*third edition*). The main concepts covered include metric spaces, sequences, series, continuity, differentiation, integration, sequences of functions, and series of functions.

## Policies

### Grading

The course will be graded as follows

Homework: 40%

Warm-ups: 10%

Midterm: 20%

Final: 30%

### Homework

There will be six written assignments, each due at the beginning of class, typically on Wednesdays.

- Late submissions will **not** be accepted.
- The lowest homework grade will be dropped.
- Please staple your work. (There is a stapler in the library of the math building.)
- Collaboration with others is acceptable, but **you must write your own solutions by yourself**. Violators will be subject to strict penalties.

**On writing quality for homework:** Written assignments constitute the largest portion of your overall grade; I expect them to be completed with this in mind. This course is as much of a course in learning about math as it is in learning *how to write* about math.

I implore you to each submission as a *final* draft. In particular, poor presentation (failure to write in complete sentences, excessive cross-outs, and general disorganization) will *not* be tolerated and will be penalized accordingly. (Your English professor would not tolerate a cross-out in the final draft of a term paper; I shall have similar expectations in the presentation of these written assignments.)

It is important to remember that what appears on the blackboard is often much less than what I would expect from a well-written homework assignment because, as a lecturer, I often fail to write out details or explanations (saying them aloud instead) and use shorthand to save time. You should do neither of these things in your written work. Instead you should write out every relevant step in logic and comply with standard English grammar and syntax, which means, in particular, that your proofs should be written in complete sentences, with proper punctuation, including periods and capitalization.

Also please avoid trying to “save space” on the page: leave adequate margins for comments, leave spaces between problems, and separate distinct portions of an argument into separate paragraphs.

As a final note, I would encourage (perhaps even demand) that you work out your solutions on separate scrap paper first, and then, once you’ve assembled a complete solution, transcribe that solution in an organized fashion onto your final draft.

## Warm-ups

There will be twenty “warm-up” problems, due at the beginning of class of each day of lecture, except the first and last days. (In particular, there will be *no* warm-up questions due on days of exams.)

The warm-up questions will be graded not on a point system but rather on a scale of three possible “grades” as follows

- Check (✓): The warm-up question was attempted with adequate effort largely in compliance with the expectations of written quality suggested above for written assignments.
- Check-minus (✓<sup>-</sup>): The warm-up question was attempted, but there was a significant lack of effort or there were significant errors in reasoning or presentation.
- Zero (0): The warm-up question was not attempted.

As with homework assignments, there is a strict policy of not accepting late warm-up solutions. Also, note that I will expect the same standards of presentation for warm-up solutions as with written assignments. Use them as an opportunity to practice writing math well.

## Exams

There will be one midterm exam and one final exam. The anticipated dates are

Midterm exam date: 06/13

Final exam date: 07/03

If you have a conflict with either of these dates, you **must** contact me ahead of time to make arrangements. (At least a week in advance is ideal.)

**On writing quality for exams:** Because of the time restraints during an exam, my expectations for the quality of written work on exams are much more relaxed than they are for the quality of written assignments. In particular, in the exam setting, it is *acceptable* to use shorthand and to be somewhat less careful in the organization and quality of your writing. Nevertheless, it is still my expectation that complete solutions will include all relevant logical steps, and solutions which make flagrant jumps in logic will be penalized accordingly.

## Textbook

The textbook is Rudin's *Principles of Mathematical Analysis (third edition)*. A version of the textbook can be found online.

## Students with disabilities

In order to receive any disability-related accommodations, students must be registered with Disability Services (DS). Students that have, or think they may have, a disability are encouraged to contact DS for more information regarding policies and services available.

## Other advice

This is a fast-paced course, so keeping up to date with material is important. The warm-ups and written assignments are designed to help you in this task. In addition, I strongly encourage you to work on homework assignments early, read the textbook before lecture, and ask questions during lecture if you have any.

# Syllabus and schedule

Date	Material	Textbook	Announcements
05/27	HOLIDAY	HOLIDAY	HOLIDAY
05/28	Ordered sets		
05/29	Ordered sets		
05/30	Topology		HW1 due
05/31	Topology		Quiz 1
06/03	Topology		
06/04	Sequences		
06/05	Sequences		HW2 due
06/06	Series		Quiz 2
06/10	Series		
06/11	Continuity		
06/12	Continuity		HW3 due
06/13	<b>Midterm exam</b>		
06/17	Differentiation		
06/18	Differentiation		
06/19	Integration		HW4 due
06/20	Integration		Quiz 3
06/24	Integration		
06/25	Sequences of functions		
06/26	Sequences of functions		HW5 due
06/27	Series of functions		Quiz 4
07/01	Stone-Weierstrass		
07/02	Review		
07/03	<b>Final exam</b>		HW6 due
07/04	HOLIDAY	HOLIDAY	HOLIDAY