

Math 112 - 01 Introduction to Analysis

Online: MWF 7:55 - 8:45

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Course Description: Full course for one semester. Field axioms, the real and complex fields, sequences and series. Complex functions, continuity and differentiation; power series and the complex exponential. Prerequisite: Mathematics 111 or equivalent. Lecture-conference.

Learning Outcomes: After completing the course students will:

- Be able to read and write rigorous mathematical proofs using a variety of techniques including direct proof, proof by contradiction and induction.
- Understand and work with the field axioms.
- Know properties of the real and complex numbers.
- Have familiarity with rigorous proofs of important theorems from Calculus including the Intermediate Value Theorem and the Mean Value Theorem.
- Understand what it means for, and be able to prove that, a sequence of complex numbers converges.

Distribution Requirements: This course can be used towards your Group III, “Natural, Mathematical, and Psychological Science,” requirement. It accomplishes the following goals for the group:

- Use and evaluate quantitative data or modeling, or use logical/mathematical reasoning to evaluate, test, or prove statements.
- Given a problem or question, formulate a hypothesis or conjecture, and design an experiment, collect data or use mathematical reasoning to test or validate it.

This course *does not* satisfy the “primary data collection and analysis” requirement.

Course Design:

- **Lecture:** Before class you will be asked to watch a short lecture. Lectures will be posted at least 24 hours before the corresponding class meeting. Questions about the lecture will be answered via email, the course Discord, or at the start of class.
- **Class Sessions:** The start of class will be dedicated to answering questions from the lecture and supply supplemental exercises as necessary. The remainder of the class time will be spent working on problems with your peers. Collaborative problem solving is an essential part of learning the course material.
- **Homework:** I will assign a weekly homework assignment that will be due via Gradescope weekly on Wednesday before the start of class. The homework will usually consist of a few computational problems and a few more involved problems.

Some more general thoughts on the reasoning for teaching this course in this way can be found on my webpage.

Course Text: We will use the free textbook *Introduction to Analysis* by Irena Swanson. A pdf can be found [here](#).

Course Moodle: I will use Moodle to host most information about the course. In particular you will be able to find the lecture videos, homework assignments and exams there.

Course Discord: We will be using a discord server! This is an excellent place to ask questions, chat or post memes.

Office Hours: Office hours will be held on our class Discord server. We will pick a time together during the first week of class. I am happy to meet with you outside of these times schedule permitting. Office hours can be used to ask questions, get additional help with homework or understanding parts of the lecture, or to explore a topic more deeply. Office hours are one of the most valuable part of a Reed education (in my

opinion) and you are strongly encouraged to take advantage of them. If you are struggling with any of the material, I cannot emphasize the importance of office hours enough.

Problem Sessions: There will be weekly problem sessions hosted by the course assistant. Details will be emailed during the first week.

Additional Support: The math department hosts drop-in tutoring on Zoom Sunday-Thursday from 7-9pm. Junior and senior math major tutors will be available to help answer questions and work with you on homework questions. In addition, every Reed student is entitled to one hour of free individual tutoring per week. Use the tutoring section in IRIS to arrange a meeting with a student tutor.

Additional Additional Support: It is genuinely important to me that you feel supported. If there is ever anything you feel could help you be more successful in the course please do not hesitate to ask. I am happy to work with you to make sure you are able to get as much out of the course as possible.

Exams: There will be two midterm exams and a cumulative final exam, see below for dates. The midterm exams will be posted to Moodle. You will be able to pick a subset of the subsequent 2-3 days to complete the exam and submit your solutions via Gradescope. You will be able to earn back some amount of missed points after the exam by doing exam corrections and participating in an exam conference. Except under extremely unusual circumstances, you must inform me in advance of the missed test.

Prior to the exam there will be a review sheet with a list of topics covered on the exam as well as additional practice problems. Additional review time should be available upon request.

Submitted Work: All work will be submitted through Gradescope. You will receive a link to Gradescope along with information about using it during the first week of class. All work that you submit you should satisfy the following:

- Your work must be neatly written or typeset.
- Your solution should be thorough, showing every part of your thought process. This is, of course, a somewhat ambiguous statement but the general standard should be that another student in the course could read your solution and not have to wonder how you got from one step to the next.
- For problems that are not simply computations, your solutions should be presented in complete sentences.

Collaboration: You are strongly encouraged to collaborate with other students on the assigned homework. You must write up your solutions independently. Duplicated solutions will not be accepted and, in my opinion, constitute a violation of the Honor Principle.

Shared Expectations: Perhaps more than most math courses you have taken, the way this class is being taught will require students to work closely together. The goal of this collaboration should be to learn more through cooperation by genuinely listening to others ideas and sharing our own. With that in mind, we should all expect consideration, patience and curiosity from each other. You can expect that I will do my best to present the material in an interesting and engaging way. You can also expect that I will provide feedback and guidance that will help you excel in the course.

Attendance: *If you are sick, think you might be sick or have been in close contact with someone sick do not come to class. There is no penalty for not attending class.* If you are healthy then attendance is strongly encouraged and represents a part of your grade.

Learning In the Time of Covid-19: See some thoughts on my webpage.

Communication: In light of everything, I wanted to take a minute to emphasize how important communication is going to be this semester. If problems arise throughout the semester, Covid related or otherwise,

I will be in a much better position to support you if you can talk to me early on.

Grading: Your grade will be based on

Homework:	25%
Class participation:	15%
Midterm 1:	20%
Midterm 2:	20%
Final Exam	20%

Important Dates: Coming Soon.

Academic accommodations: If you have a documented disability requiring academic accommodation, please have Disability & Accessibility Resources (DAR) provide a letter during the first week of classes. I will then contact you to schedule a meeting during which we can discuss your accommodations. If you believe you have an undocumented disability and that accommodations would ensure equal access to your Reed education, I would be happy to help you contact DAR.