

MATH 325.010 – Analysis

Fall 2021 Syllabus (*Last Updated 10/25*)

| | | | |
|---------------------|--|------------------|--|
| Instructor | Norman Cao | Email | norman.cao@cims.nyu.edu |
| Lecture | Mon/Wed 8:00-9:15am | Classroom | ONLINE |
| Office Hours | (refer to NYU Brightspace course page) | Office | ONLINE |

Textbook

The course will use “Basic Analysis I”, by Jiří Lebl. The book is available for free online in PDF format at <https://www.jirka.org/ra/>. Paper copies can also be purchased online. Exercises will be assigned based on the latest online version of the book.

Objectives

Math 325 Analysis is an upper level course which serves as an introduction to real analysis. Unlike lower level math courses which focus more on computation aspects of mathematics, this is a theoretical course that focuses on the foundations of calculus and the real numbers.

In this course, students will learn how to read, write, and understand mathematical proofs. All homework and exam problems will require students to write rigorous proofs. In addition, students will gain an understanding of the techniques and ideas used to rigorously understand (“analyze”) calculus and the real numbers. The course content is roughly organized into three parts:

1. Foundations of analysis. Real numbers, sequences, and continuous functions
2. Rigorous treatment of calculus. Differentiation and integration.
3. Topics in modern analysis. Sequences of functions and metric spaces.

The material covered in this course forms a core pillar of modern mathematics. The ideas of analysis also appear in and have applications to other scientific disciplines.

Calendar

Tentative schedule following the textbook:

- Sets (Chapter 0) and Real Numbers (Chapter 1): Sep 8, 13, 15, 20
- Sequences and series (Chapter 2): Sep 22, 27, 29, Oct 4
- Continuity (Chapter 3): Oct 12, 13, 18, 25, 27
- **Midterm 1: Wednesday, October 20**
- Differentiation (Chapter 4): Oct 27, Nov 1, 3
- Integration (Chapter 5): Nov 8, 10, 15, 17
- **Midterm 2: Monday, November 22**
- Sequences of functions (Chapter 6): Nov 24, 29, Dec 1
- Metric Spaces (Chapter 7): Dec 6, 8, 13

Communication and Software

The syllabus, Zoom link for lectures, lecture notes, lecture recordings, homework solutions, and any updates/announcements for this course will be posted on [NYU Brightspace](#). Homework will be submitted and graded electronically via [Gradescope](#).

Any course-related questions should be asked via [Campuswire](#). **Please follow the link and enter the code 0547 to join our course section.** Asking and answering questions can be done anonymously to other students if you wish. It is encouraged to answer each other's questions. I will check Campuswire regularly, and add to answers if needed.

Course Components and Grading

Homework (30%):

Homework will be assigned weekly via Gradescope, except during exam weeks. Solutions should be submitted online via Gradescope. Late homework will only be accepted either due to emergency circumstances, or if *prior notice at least 24 hours in advance* is given for non-emergency circumstances (refer to the sick and late policy below).

While collaboration is highly encouraged, each student is responsible for writing up their own solutions individually. Direct copying of another student's homework, even if both students contributed, is considered a violation of academic integrity.

Homework should be written clearly, and proper justification is required. For an idea of what constitutes a rigorous and complete proof, students should consult the course textbook, the homework solutions, or the recitation sections. Even if you are unable to fully solve a problem, please submit your best attempt as partial credit will be awarded.

In order to allow the grader to give more detailed feedback on homeworks, not all exercises may be graded (you will not know which). The lowest homework score will be dropped from the final grade.

Participation (5%):

While live attendance at recitations is not mandatory, it is **highly recommended**, as recitations will focus on problem solving and concrete usage of the ideas introduced in lecture. In order to receive a full participation grade, you can do any combination of the following:

- Ask or respond to a total of two questions on Campuswire
- Attend and actively participate in recitation
- Attend office hours (either with instructor or TA)
- Collaborate on at least 2 homeworks (please write names of collaborators on HW)

Exams (65%):

There will be two midterm exams and a cumulative final exam. The two midterms will be held **synchronously during lecture time** (see Calendar section), while the final exam will be held during finals week (time and date TBA)

The 65% exam component will be determined from your three exam grades (two midterms + one final) by the following formula:

$$25\% \text{ (highest of three exam grades)} + 20\% \text{ (2nd highest of three exam grades)} + 10\% \text{ (lowest of three exam grades)} + 10\% \text{ (final)}$$

Sick and Late Policy

Extensions on homework will be granted in qualifying cases, such as religious holiday, family emergency, sickness that extends over several days, qualified academically related activity, or unavoidable circumstance which prevents you from working on the homework. I will generally try to be flexible and understanding with late homework, however, **non-emergency extensions will only be granted if requested at least 24 hours prior to the homework due date**. If you miss a homework or exam due to emergency circumstances, please contact me ASAP via email.

Other Course Policies

I expect students to contribute to our positive learning environment: **try to attend live classes**, **pay attention** for the duration of the class, **participate** meaningfully during class by asking questions or answering them. Students who disrupt our learning environment will be asked to leave the Zoom session.

If you have questions related to the course, please ask them on Campuswire. If you need to send me an email, please include the course and section number you are enrolled in the subject of all email correspondence so that I may better assist you. I will normally reply within 24 hours. If I do not, please send me a reminder.

This course will abide by NYU CAS [academic policies](#) and [honor code](#).

Resources

I am available during **office hours and by appointment** to review course material or address any course related concerns. Peer tutoring is available at [University Learning Center](#) and [Undergraduate Mathematics Tutoring Center](#). Students seeking accommodations must consult the [Moses Center for Student Accessibility](#).