Course Syllabus

Math 425a: Foundational Concepts of Analysis

Section 39644, Spring 2026

Basic Information

Lectures: MWF 1:00–1:50pm, KAP 147.
Instructor: Wenyuan Li
Course Webpage: https://brightspace.usc.edu/
Email: wenyuan.li@usc.edu
Office Location: KAP 424A
Office Hours: W 10:00–12:00pm, F 2:00–3:00pm or by appointment

Course Description: The real number system, metric spaces, limits, continuity, derivatives and integrals, infinite series.
Prerequisites: Math 290 or 430 or 432.
Text: Rudin, *Principles of Mathematical Analysis, 3rd edition.*
References: Browder, *Mathematical Analysis: an introduction, 1st edition*; Pugh, *Real Mathematical Analysis, 2nd edition.*

Discussions: T 10:00–10:50am.
Teaching Assistant: Jiayi Wen
Email: jiayiwen@usc.edu
Office Location: Math Center, KAP 263
Office Hours: Math Center Schedule

Math Center: The Math Center is open from 8am to 7pm Monday-Thursday, and 8am to 5pm on Friday. It is primarily run by math graduate students here at USC. The office hours of your TA will also be held in the Math Center, although you can go to the Math Center at any time it is open to ask for help.

Course Logistics

Throughout the semester our course will make use of the following online systems:

- Brightspace for all communication, links, and course materials.
- Gradescope for homework, quizzes and exams.

It is possible that due to some reason an individual class lecture may be held remotely via Zoom. If this is the case, I will notify you in advance via Brightspace.

Assignments

Homework: Every two week a number of homework problems will be assigned on Friday. The problems are due on the Friday in two weeks at 11:59pm and should be submitted through Gradescope. The problems can be viewed on Brightspace or Gradescope.

Homework received within the first week after the due will receive at most an 80% credit (by the end of the Friday that week). No later homework will be accepted. You can drop one homework at the end of the semester.

Midterm/Final Projects: There will be 2 midterm projects and 1 final project to be submitted through Gradescope. The description can be viewed on Brightspace or Gradescope.

Exams and Grading

Exams: All exams will be held in person during the scheduled times. If you cannot be present, you must contact me BEFORE the exam date to make other arrangements. If you no-show for an exam and attempt to contact me afterward, do not expect to be allowed a make-up exam.

There are three exams in this course: two midterms and a final. The midterms will be held during normally scheduled class times. The final exam is during the exam week. It is university policy that no student may take the final exam early, or be allowed to skip it.

- Exam 1: Feb 20 Friday.
- Exam 2: Mar 27 Friday.
- Final Exam: May 6 Wednesday, 2:00–4:00pm.

Grading and Curves: Department guidelines for this course state that approximately half the letter grades should be A's and B's. So the overall class median grade will be roughly the division between B's and C's.

Your grade in the course is calculated as follows:

- Homework: 15%
- Midterm/Final Projects: 15%
- Two Midterm Exams: 40%
- Final Exam: 30%

How to calculate your current grade: The grading scale for the course will be:

- $[93 - 100] = \text{A}$
- $[90 - 93) = \text{A}-$
- $[87 - 90) = \text{B}+$
- $[83 - 87) = \text{B}$
- $[80 - 83) = \text{B}-$
- $[77 - 80) = \text{C}+$
- $[73 - 77) = \text{C}$
- $[70 - 73) = \text{C}-$

Using this scale and the weighting of the components given above, you can calculate your current grade at any time in the course. Midterm scores will be curved, but there is no curve on homework or projects.

Other Policies

Academic Integrity: The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, compromises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Disability Services: USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Course Calendar (tentative)

Week 01: Introduction, Limits of Sequences. Section 3.1, 3.5.

Week 02: Subsequences, Cauchy Sequences, Series, Series of Nonnegative Terms. Section 3.2, 3.3, 3.6, 3.7. **Monday Martin Luther King's Holiday.**

Week 03: Ratio and Root Tests, Absolute and Conditional Convergence, Power Series. Section 3.8, 3.9, 3.10, 3.12.

Week 04: Limits of Functions, Continuity, Continuity and Compactness and Connectedness. Section 4.1, 4.2, 4.3, 4.4, 4.5.

Week 05: Ordered Sets, Fields, The Real Field, Construction of the Real Field. Section 1.2, 1.3, 1.4, 1.8.

Week 06: Review. **Midterm Exam 1 on Friday. Monday President's Day.**

Week 07: Construction of the Real Field, Cauchy Sequences Revisited. Section 1.8, 3.3.

Week 08: Subsequences and Cauchy sequences Revisited, Continuity and Compactness and Connectedness Revisited. Section 3.2, 3.3, 4.3, 4.4.

Week 09: Finite, Countable and Uncountable Sets, Euclidean Spaces, Metric Spaces. Section 2.1, 1.7, 2.2.

Week 10: **Spring Break. No Class.**

Week 11: Compact Sets. Review. Section 2.3. **Midterm Exam 2 on Friday.**

Week 12: Perfect Sets, Connected Sets, Continuity and Compactness Revisited, Continuity and Connectedness Revisited. Section 2.4, 2.5, 4.3, 4.4.

Week 13: Derivatives of Functions, Mean Value Theorem, Continuity of Derivatives. Section 5.1, 5.2, 5.3.

Week 14: L'Hopital's Rule, Higher Order Derivatives, Taylor Expansion, Differentiation of Vector-Valued Functions. Section 5.4, 5.5, 5.6, 5.7.

Week 15: Definition and Existence of Riemann Integral. Section 6.1.

Week 16: Properties of Riemann Integrals, Integration and Differentiation, Integration of Vector-Valued Functions. Section 6.2, 6.3, 6.4.