

Math 452 - Introduction to Real Analysis II, Spring 2026

Course Syllabus

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Office: Learning Resource Center 323J

Office hours: Mon: 1-2, Tues: 11-12, Wed: 1-3, Thurs: 12-1, Fri: 11-12 (or by appointment)

Class Room/Time: RRC-B 313, MWF 9:00-9:50 am

Course website: community.wvu.edu/~bal0018/math452S26.html

Homework assignments and course announcements may be posted on the website or sent via email. Please be sure to check the website regularly, and to regularly check the email address you have on record. You are responsible for any information posted on the course website.

Textbook: There are no required textbooks for the course. However, a recommended textbook is *Analysis II*, Third Edition, by Terence Tao. In addition to the required homework exercises that I will write up, I will also assign optional exercises out of this textbook. I can also give other recommendations for real analysis books upon request, both more advanced and less advanced than this course.

Catalog Data: MATH 452. Introduction to Real Analysis 2. (3-0) Credits 3. Rigorous study of the theory of functions of real variables. Covers basic topics including differentiation, Riemann integral, Riemann-Stieltjes integrals, power series, uniform convergence, improper integrals.

Prerequisite: MATH 451 with a minimum grade of C-.

Course material: Roughly the first third of the course will cover metric space topology, in which we will rehash some material from Analysis I such as convergence of sequences and continuity of functions, but reframed in the world of more general metric spaces. We will then spend some time discussing sequences of functions and series of functions (through both power series and Fourier series). If time permits, in the final couple weeks of the course, we'll go through some miniature introductions to further areas of study in analysis. Time permitting, these areas may include multi-variable differential calculus (and the implicit function theorem), general topology, Lebesgue measure theory, complex analysis, functional analysis, or ordinary differential equations.

Course Objective: This course is designed to introduce the rigorous foundation for the basic topics of analysis to the students majoring in mathematics.

Course Outcomes: Upon successful completion of the course, the student will be able to do the following:

1. Write mathematical solutions in a clear, effective, and concise manner.
2. Use point-set topology terminology and theory to generalize topics from Calculus.
3. Recognize the difference between pointwise and uniform convergence of sequences of functions.
4. Illustrate and prove statements about series of functions, including convergence properties of power series and Fourier series.
5. Describe and prove mathematical statements and establish theorems from Real Analysis in order to demonstrate critical thinking.

Topics:

1. Introduction to Metric Spaces and Sequences in Metric Spaces
2. Functions on Metric Spaces and Continuity
3. Sequences of Functions and Uniform Convergence
4. Power Series
5. Fourier Series
6. Special Topics (if time permits)

Grading: Your final grade will be based on homework, one project, two exams during the semester, and the final exam, which will not be cumulative. Your final course score will be computed via the following grading scheme:

- 25% Homework + 15% Project + 20% Exam 1 + 20% Exam 2 + 20% Final Exam

Letter Grade Cutoffs: A: 90%, B: 80%, C: 70%, D: 60%, F: below 60%

Homework: Homework assignments will be posted on the course website. There will likely be about 10 total assignments, and your lowest 2 homework scores will be dropped from grade computation. The homework is the most important part of this class. To be more precise, not knowing how to do the homework is the most important part of this class. At this level, mathematics is learned by trying to solve problems and failing over and over again. Therefore, you should be prepared to spend many hours each week in frustration, finding flaws in your arguments, or simply stuck not knowing what to do next! To that end, every student is expected to write out their own solutions for the homework problems. Any verbatim copying of solutions, either from another student or from a textbook or online resource, is prohibited and is considered plagiarism. However, you are permitted and even encouraged to collaborate with each other, as long as each student writes up a final copy of their solutions on their own.



Project: Each student will be given a slightly more difficult problem to solve on their own and present their solution in class. You will have between two and three weeks to work on this from the time it is assigned to the time you will present. The purpose of this project will be to strengthen your problem-solving abilities, your proof-writing abilities, and your presentation abilities. More details will be given in class.

Exams: There will be two exams during the semester, details TBA. The final exam period scheduled by the university is Wednesday, May 6 from 8:00-9:50, though the details of that exam are also TBA. Make-up exams will only be given to students with excused absences, and such make-up exams must be scheduled within 24 hours of the missed exam.

Getting Help: Always remember: asking for help when you need it is not a sign of weakness, but a sign of strength! Please feel free to attend my office hours or email me if you have questions about the course material. If you are unable to make it to my regularly scheduled office hours, I am willing to make an appointment to meet at another time if possible. Free tutoring is also available through the Student Success Center, located in the library on the second floor of LRC. You may also qualify for TRIO SSS, located in Benedum 100, which also provides tutoring services. Additionally, for quick math questions, you can feel free to stop by the Math Department in LRC 323 and ask any math professor with an open door. Finally, I would also encourage the formation of study groups, to learn from each other and help each other learn.

Class policies:

- Graphing calculators will never be allowed during any exams. Scientific calculators will be considered on an exam by exam basis. You may use any calculator to help you do the homework if you wish, but you should keep in mind that you may be required to solve similar problems without a calculator on the quizzes and exams.
- If you believe a problem on a homework assignment or exam has been graded incorrectly, you must notify the instructor of your complaint within 7 days of the date the exam is handed back. If you are unable to retrieve your graded material at the time it is handed back, it is your responsibility to make arrangements with the instructor to retrieve the material at another time.

Institutional Policies: Students are responsible for reviewing policies on inclusivity, academic integrity, incompletes, sale of course materials, sexual misconduct, adverse weather, student evaluation of instruction, and other statements. For these detailed policies of West Virginia University, please review:

<https://facultysenate.wvu.edu/resources/syllabus-policies-and-statements>.