MATH 381 A: Real Analysis
Spring 2025

Instructor: Dr. Michael Weselcouch
Office: Trex #270F
Student Hours: TR 11:00 - 12:00 or by appointment
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Course Description. The aim of this course will be to challenge and improve mathematical intuition rather than simply verify it. This will be done by taking a mathematically rigorous approach to the study of functions of a real variable. While many of the topics will seem familiar from your calculus courses, the focus will not be on concepts that are easily visualized. Most of our work will involve complete understanding of definitions, applying them in contexts where simple intuition will fail, and extensive use of formal proofs as communication.

Learning Outcomes. By the end of this course, successful students will be able to:

- Use definitions of calculus terms to solve problems and contrast with other terms.
- State important calculus theorems and know when they are not valid.
- Use proof techniques to progress from one calculus result to the next.
- Apply calculus definitions to complicated functions of theoretical interest.

Course Materials.

- *Textbook: Understanding Analysis* Abbott, 2nd Edition

Attendance Policy. Class attendance is a very important aspect of a student's success in this course. The student is expected to attend every class and is accountable for missed content and assignments.

Structure and Grading. A grade scale will be determined after final grades are computed, but will be no worse than the scale given below. Attendance and class participation will be considered when determining marginal grades.

Grading Scale

		93-100	A	90-92.99	A-
87-89.99	B+	83-86.99	B	80-82.99	B-
77-79.99	C+	73-76.99	C	70-72.99	C-
67-69.99	D+	63-66.99	D	60-62.99	D-

The final course grade is determined in the following way:

Tests	60%	Problem of the Day	10%
Homework	10%	Presentation	20%

Tests. Five tests will be given throughout the semester according to the schedule on the last pages of the syllabus (any changes from this schedule will be announced well in advance). Each test will focus on the material learned since the last test, but as with most mathematics classes, the exam will necessarily require you to understand and remember things from the past.

Test Make-up Policy. Test make-ups are administered in accordance with College policy. Anticipated, excused absences must be reported to the instructor with appropriate certification *well before* the scheduled test date. Legitimate emergency absences must be reported with appropriate documentation within one week of returning to class. No other make-ups will be given.

Homework. Homework will be assigned after nearly every class. This work will be collected at the start of our next class period. If you miss class, you can submit your work to Inquire before the start of class. No late papers will be accepted without arrangements approved prior to absence OR without written documentation from a college official.

Problem of the Day. We will start nearly every class with a Problem of the Day (POD). You will have about 5 minutes to complete the problem and you can use your notes (not computer) for assistance. PODs cannot be made up for unexcused absences. At the end of the semester, your lowest three POD grades will be dropped. These will be graded on a scale of 0 (not turned in) to 3 (perfect).

Presentation. The final presentation will allow you to explore a topic in Real Analysis beyond the scope of our class material. You will select a topic of interest, conduct research, and present your findings to the class. Presentations should demonstrate a clear understanding of the topic, highlight its significance in Real Analysis, and include well-organized explanations. Detailed guidelines and a list of suggested topics will be provided early in the semester.

Corrections to Grading. If you think an error may have been made in the grading of your test, carefully review the answer key posted on Inquire and then contact the instructor **within 1 week of the test's return** with your question. **Do NOT alter the original work**. The entire test may be re-graded and the test grade is *subject to remain the same, increase or decrease* at the discretion of the instructor.

MCSP Conversations. The MCSP department offers a series of talks designed to appeal to a broad audience. Members of this class are encouraged to attend many of these meetings, however attending at least one session is mandatory. The schedule for the talks is posted on Inquire. Within one week of attendance you must submit a response to the talk. This will count towards your Homework grade.

Expected Work Policy. This course expects you to spend at least 12 hours of work each week inside and outside of class.

Electronic Devices. You can use only your calculator during class unless stated otherwise. (This means no cell phones - please set them on silent and leave them in your bag.)

Inquire Policy. Students are required to be knowledgeable of all postings on Inquire. It is each student's responsibility to consistently monitor Inquire for course information. This means every day! Any assignment that requires an Inquire upload will not be accepted in any other form. Also, to receive credit for uploads, the file must be readable on the instructor's college computer. It is the student's responsibility to make successful submissions. It is the student's responsibility to resolve technology problems through the college's IT department.

Academic Integrity. I expect all of you to follow the Academic Integrity policies of Roanoke College. All work submitted for a grade must be your own (for instance, you cannot use internet resources aside from my own YouTube videos or other videos linked on Inquire and, if you do work and study with others, the final write-up must be done by yourself). If you ever have questions about how these policies apply to our class please contact me. Any violations of our AI policies will automatically be turned over to the Academic Integrity Council.

Artificial Intelligence. There are situations when the use of generative AI may be appropriate and educational. If you believe that your use of generative AI is appropriate for a given assignment, please contact me (via email, or in person at least 3 days before the due date) to explain your rationale for its use. No use is permitted without prior permission.

Subject Tutoring. Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4 pm – 9 pm, Sunday – Thursday. We are a Level II Internationally Certified Training Center through the College Reading and Learning Association (CRLA). Subject Tutors are friendly, highly-trained Roanoke College students who offer free, one-on-one tutorials in a variety of general education and major courses such as: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, INQ 250, and Social Sciences (see all available subjects at www.roanoke.edu/tutoring). Tutoring sessions are available in 30 or 60-minute appointments. Schedule an appointment at www.roanoke.edu/tutoring, or contact us at (540)375-2590 or subject_tutoring@roanoke.edu. We hope to see you soon!

AES. Accessible Education Services (AES) is located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. To schedule an appointment, call (540)375-2247 or e-mail aes@roanoke.edu. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact the AES at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester.

Course Schedule

Week	Dates	Lecture Material	Assignments
1	1/13, 1/15, 1/17	Section 1.1, 1.2, 1.3, 1.4	
2	1/20, 1/22, 1/24	Section 1.4, 1.6	
3	1/27, 1/29, 1/31	Section 2.1, 2.2	Test 1 (1/29)
4	2/3, 2/5, 2/7	Section 2.3, 2.4, 2.5	
5	2/10, 2/12, 2/14	Section 2.6, 2.7	
6	2/17, 2/19, 2/21	Section 3.1, 3.2, 3.3	Test 2 (2/17)
7	2/24, 2/26, 2/28	Section 3.4	Test 3 (2/28)
8		Spring Break	
9	3/10, 3/12, 3/14	Section 4.1, 4.2, 4.3, 4.4	
10	3/17, 3/19, 3/21	Section 4.5, 5.1, 5.2, 5.3	
11	3/24, 3/26, 3/28	Section 6.1, 6.2	Test 4 (3/26)
12	3/31, 4/2, 4/4	Section 6.3, 6.4, 6.5	
13	4/7, 4/9, 4/11	Section 6.6, 7.1, 7.2, 7.3	
14	4/14, 4/16,		Test 5 (4/16)
15	4/21, 4/22		Presentations
	4/26	8:30 - 11:30	Presentations