

MATH 4307: Real Variables

Sul Ross State University ~ Rio Grande College
Spring 2015

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Course Description MTH 4307 is intended as an introduction to the modern theory of real analysis.

Course Objectives Students will explore the theory behind the real numbers, sequences, continuous functions, differentiable functions, and integration.

Mathematics Program Outcomes The graduating student will be able to demonstrate content knowledge in mathematics including arithmetic, algebra, geometry, probability, statistics, and calculus.

Class Time Tuesday and Thursday, 12:30 – 1:45 p.m.

Class Location Del Rio 107; Eagle Pass B112; Uvalde B114c

Required Text Kenneth A. Ross, *Elementary Analysis: The Theory of Calculus*, Second Edition, ISBN 9781461462705

Office Hours M/W, 11:00 a.m. – 2:00 p.m.; T/Th, 10:30 a.m. – 12:30 p.m.

Course Policies

Attendance Policy

Attendance is mandatory. You will be held responsible for all material covered in class or in the reading assignments. If you have to miss a class, it is your responsibility to obtain all notes, assignments, and announcements from someone else in the class. Make-up exams will be given only in the event of an emergency, in which case written justification and/or documentation must be provided and approved.

Communication

I will post course documents, reminders, announcements, and assignments on the Blackboard system. You will also submit homework on Blackboard. I may also occasionally send announcements via e-mail. You should make sure you know how to access and use these tools. E-mail is the best way to contact me.

You are welcome to stop by my office if you wish to speak about the content or your progress in the course. I am here to help you. Ask questions in class, call me, e-mail me, or come to my office. If you don't communicate with me, then I can't help you.

Grading Policy

Your grades will be weighted as follows:

Homework	30%
Midterm Exam	30%
Final Exam	40%

A student who averages at least 90% will receive an A; at least 80% will receive at least a B; at least 70% will receive at least a C; at least 60% will receive at least a D.

Homework

This is essentially a course in proof-writing. It will be very slow-paced, and the homework is crucial. The goal of the course is not so much to teach you a certain amount of information as to teach you how to read and write mathematical proofs. If you don't do the work, you won't get anything out of it.

All homework will be submitted as Microsoft Word 2007 documents (.docx) on Blackboard. You will use the Equation Editor for mathematical notation. I will provide detailed feedback, which you should read carefully and use to correct your proofs.

Proof-writing is hard. It was hard for me when I took this course as an undergraduate, and it will most likely be hard for you, too. It's very different from what you might be used to from your lower-level math courses. The material is the same as in Calculus I and II, but the approach is different. The learning curve is steep. I am here to help you make the climb. I just ask that you be an active and willing participant.

Exams

There will be one midterm exam. Its tentative date is Wednesday, March 12. This is subject to change. You will be notified of a change at least one week in advance. Make-up exams will be given only in the event of an emergency, in which case written justification and/or documentation must be provided and approved.

The final exam is scheduled for Tuesday, May 12, from 12:00 – 2:45 p.m. It will be comprehensive.

Subject Outline

- I. Number Systems: *sets and set notation – the set \mathbb{N} of natural numbers – the set \mathbb{Q} of rational numbers – the set \mathbb{R} of real numbers – the Completeness Axiom*
- II. Sequences: *basic notions – limit theorems – monotone sequences and Cauchy sequences – subsequences – lim sups and lim infs – series – decimal expansions*
- III. Continuity: *continuous functions – properties – uniform continuity – limits of functions*
- IV. Differentiation: *the derivative and its properties – the Mean Value Theorem – Taylor's Theorem*

Schedule

This schedule is tentative only. The unit numbers refer to the above outline.

Units I – II	January 20 – March 10
Midterm Exam	March 12
Spring Break	March 16 – 20
Units III – IV	March 24 – May 7
Final Exam	May 12

Americans With Disabilities Act

Sul Ross State University is committed to equal access in compliance with the Americans With Disabilities Act of 1973. It is the student's responsibility to initiate a request for accessibility services. Students seeking accessibility services must contact Kathy Biddick, Student Services Administrative Secretary.