MATH 4307: Real Variables

Sul Ross State University ~ Rio Grande College
Spring 2017

Professor: Michael Ortiz, Ph.D. **Office:** Uvalde Campus A101
E-mail: mortiz4@sulross.edu **Telephone:** (830) 279-3048

Course Description	MTH 4307 is intended as an introduction to the modern theory of real analysis.
Course Objectives	Students will explore the axiomatic foundations of the real numbers; deepen their understanding of the theory behind sequences and continuous functions; use a variety of hands-on tools to explore abstract mathematical concepts; develop higher-level proof-writing skills; and apply proof-writing techniques to a variety of problems.
Mathematics Program Student Learning Outcomes	The student will (1) be able to demonstrate content knowledge in the foundations of mathematics, including discrete mathematics and geometry, (2) be able to research a humanistic mathematical topic and communicate their knowledge in writing, and (3) be able to research a humanistic mathematical topic and communicate their knowledge orally.
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 11:30 – 2:00; T/Th 2:00 – 4:30

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.

Exams

There will be one midterm exam. Its tentative date is March 9. 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 9, 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 17 – March 7
Midterm Exam	March 9
Spring Break	March 13 – 17
Units III – IV	March 21 – May 4
Final Exam	May 9

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.