

MATH 5311: Real Variables

Sul Ross State University ~ Rio Grande College
Spring 2016

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Course Description MTH 5311 is intended as an introduction to metric spaces, Lebesgue measure, integration, differentiation, function spaces, and harmonic analysis.

Class Time Wednesday, 6:00 – 8:45 p.m.

Class Location Del Rio 101; Eagle Pass B114; Uvalde B111; Castroville 119

Required Text The required textbook is Kenneth Ross, *Elementary Analysis: The Theory of Calculus*, ISBN 9781461462705.

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

Homework

You will turn in homework assignments on a weekly basis. Exercises from the text will be prepared as Microsoft Word documents and turned in via Blackboard. You will need to use a recent version of Word, such as is available on school computers.

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 Wednesday, May 11, from 6:00 – 8:45 p.m. It will be comprehensive.

Grading Policy

Your grades will be weighted as follows:

Homework	30%
Midterm Exam	30%
Final Exam	40%

Subject Outline

- I. Number Systems: *the set \mathbb{N} of natural numbers – the set \mathbb{Q} of rational numbers – infima and suprema – the set \mathbb{R} of real numbers – the Completeness Axiom – the Archimedean Property – Dedekind cuts*
- II. Sequences: *basic notions – examples and computations – proofs – limit theorems – monotone sequences – Cauchy sequences – subsequences – the Bolzano-Weierstrass Theorem – lim sups and lim infs – metric spaces and topology – series – convergence tests – decimal expansions and real numbers*
- III. Continuity: *continuous functions and their properties – the Intermediate Value Theorem – connections with geometry – uniform continuity – limits of functions – metric spaces and continuity – metric spaces and connectedness*
- IV. Sequences and Series of Functions: *power series – uniform convergence – differentiation and integration of power series – Abel's Theorem*
- V. Differentiation: *the derivative and its properties – Rolle's Theorem – the Mean Value Theorem – L'Hospital's Rule – Taylor's Theorem*
- VI. Integration: *the Riemann integral – properties – the Fundamental Theorem of Calculus – integral theorems*

Schedule

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

January 20	Unit I
January 27	Unit I
February 3	Units I – II
February 10	Unit II
February 17	Unit II
February 24	Units II – III
March 2	Unit III
March 9	Midterm Exam; Unit IV
March 16	Spring Break
March 23	Unit IV
March 30	Units IV – V
April 6	Unit V
April 13	Units V – VI
April 20	Unit VI
April 27	Unit VI
May 4	Course Review
May 11	Final Exam

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.