

Syllabus - Fall 2001 Math 361/461: Advanced Calculus I

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Course webpage: <http://www.math.unm.edu/~crisp/courses/math361/info.html>

This class is cross-listed as:

Math 361 - Call # 16852.

Math 461 - Call # 10616.

Schedule: 11:00-12:15am, Fr 11:00-11:50am - HUM 428

Office Hours: Tue 10:00-11:00am, Th 4:30-5:30pm, Fr 12:30-1:30pm.

Textbook: *Analysis with an introduction to proof.* by Steven R. Lay (required).

There are many other excellent introductory analysis books. Reading from other sources could be very valuable.

Course Structure: There are 3 lectures per week. The course will cover most of the material in Chapter 1-7 of the textbook. It is very helpful to read the material before it is discussed in class. There is a tentative syllabus in the back of this page, we might have to adjust it as we go along. Tuesdays and Thursdays will be devoted to lecturing new material. The additional hour (Fridays at 11am) will be used for problem solving and, occasionally, review of the material.

Course content: This is a first course in analysis. We will cover the fundamentals of calculus in one variable, starting with the definition of the real numbers, sequences of numbers and working our way through the concepts of limits, functions, continuity and basic properties of functions, we will then study carefully the theory of differentiation and integration. Basic calculus is a prerequisite, it provides you with computational skills and some intuition. We do not expect the students *to be able to read, understand, and actually construct mathematical proofs* at the beginning of the course. A great amount of time will be devoted to learn and practice logical thinking. At the end of the course we expect the students to have acquired the basic skills of mathematical reasoning, plus a deeper understanding of calculus.

Homework: Homeworks will be assigned periodically. You are encouraged to discuss the homework with each other, but you should do the writing separately. You learn mathematics by doing, and there is no way around it, it is not enough to see your teacher or your friends solving problems, you have to try it yourself. Difficult as it may seem at the beginning if you persist you will learn how to write a proper mathematical proof, you will learn how to read and understand other's proofs, and you will learn to appreciate and enjoy the beauty of an elegant argument.

Exams: There will be two midterms during weeks 6 and 12 (see schedule/syllabus behind), and a two-hour final exam as scheduled by the registrar Office.

Grades: The final grade will be determined by your performance on homeworks, midterms, and final exam. The grading policies will be discussed in class.

Americans with Disabilities Act: Qualified students with disabilities needing appropriate academic adjustments should contact me as soon as possible to ensure your needs are met in a timely manner. Handouts are available in alternative accessible formats upon request.

MATH 361 - ADVANCED CALCULUS I

Week	Date	Read	Topics
1	Aug 20-24	Ch. 1 - Sec 1-3	Introduction. Logic and proof
2	Aug 27-31	Ch. 1 - Sec 4 Ch. 2 - Sec 5-6	Techniques of proof. Set theory.
3	Sep 3-7	Ch. 2 - Sec 7-8 Ch. 3 - Sec 10	Functions and cardinality. Natural numbers and induction.
4	Sep 10-14	Ch. 3 - Sec 11-12	Ordered fields. Infimum and supremum.
5	Sep 17-21	Ch. 3 - Sec 13-14	Topology of the reals, compact sets.
6	Sep 24-28	Ch. 3 - Sec 15 Midterm # 1	Metric spaces - Review
	Sep 29 -	<i>Last drop day</i>	
7	Oct 1-5	Ch. 4 - Sec 16-17	Sequences: convergence and limits
8	Oct 8-10	Ch. 4 - Sec 18-19	Cauchy sequences, subsequences
	Oct 11-12	<i>FALL BREAK</i>	
9	Oct 15-19	Ch. 5 - Sec 20-22	Limits and continuity of functions
10	Oct 22-26	Ch. 5 - Sec 22-24	Uniform continuity. Continuity in metric spaces.
11	Oct 29-31 Nov 1-2	Ch. 6 - Sec 25 Review	Differentiation.
12	Nov 5-9	Midterm # 2 Ch. 6 - Sec 26	Mean value theorem.
	Nov 9	<i>Last withdraw day</i>	
13	Nov 12-16	Ch. 6 - Sec 27-28	L'Hopital's rule. Taylor's theorem.
14	Nov 19-21 Nov 22-23	Ch. 7 - Sec 29 <i>THANKSGIVING</i>	Riemann integral.
15	Nov 26-30	Ch. 7 - Sec 30-31	More integration. Fundamental Theorem of Calculus.
16	Dec 3-7	Review week	
	Dec 11th	FINAL EXAM	10am-noon