

MA 471G 001
Advanced Calculus I
Fall 2008

Instructor: Prof. Richard Carey

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Text: *Advanced Calculus* 3^h ed., 1978 by R. Creighton Buck & Ellen F. Buck

References: *Principles of Mathematical Analysis* 3^h ed., 1976 by Walter Rudin
Real Functions, 1953 by Casper Goffman

Prerequisite: MA 214 and Ma 322.

Background: It is assumed that the students have learned to use elementary calculus, but are not experienced in the techniques of proof and rigorous reasoning. After the elementary calculus sequence the advanced calculus usually provides the student's first experience with an abstract mathematical course.

The course provides a rigorous introduction to the analysis of real-valued functions - one of the fundamentals of contemporary mathematics. Emphasis is shifted from computational to primarily theoretical aspects of mathematics, so that the content of the course includes not only formulations and theorems but the corresponding proofs given in a complete form. In particular, the student is acquainted with the principles of mathematical reasoning using patterns of number sets and number valued functions. We deal with aspects of set theory relevant to the study of real function analysis and consider many important properties of the set \mathbb{R} of real numbers, furnished with order, field and completeness axioms. We introduce a topology on \mathbb{R} and the Heine-Borel theorem as a criterion of compactness is formulated. We define the fundamental notions of limits and continuity property of continuous functions. We introduce concepts of monotone and inverse functions, define the derivative of a function and prove some mean value theorems. The final part of the course deals with the theory of integration. We introduce Riemann Integrals and some important applications of the theory of integration are illustrated.

The following topics from the text are expected to be covered:

Appendix 1 Logic and Set theory

Appendix 2 Foundations of the Real Number System

Chapter 1 Sets and Functions

Chapter 2 Continuity

Chapter 3 Differentiation

Chapter 4 Integration

Chapter 5 Series

Chapter 6 Uniform Convergence (of functions)

Grading: Your grade will be calculated from the following distribution of points:

Oral Presentations: (100 points) Everyone will be expected to present some number of problems in class. These presentations need to be both clear and concise. Further, the rest of the class is responsible for monitoring the presentation for accuracy. Details regarding the oral presentations will be provided on a separate handout.

Homework problems: (100 points) From time to time I will ask for a complete solution to a particular homework problem to be submitted. Your solution will be graded on the basis of accuracy, exposition and neatness. Preparation of problems for presentation must be your own, and submission of written homework problems must also be done on an individual basis.

Exams: There will be three take-home exams given in this course. The grading scale for the first two exams will be as follows:

90-100	A
80-89	B
70-79	C
60-69	D
Below 60	E

The grading scale for the final exam will be as follows:

117-130	A
104-136	B
91-103	C
78-90	D
below 78	E

Your course score will be the sum of your test scores and the instructor score.

The grading scale for the course will be as follows:

Cumulative score	Grade
477-530	A
424-476	B
371-423	C
318-370	D
below 318	E

The exams will be curved in the following way. The mean of all students who earn 40%

(55% on the final exam) or more on an exam will be computed. Points will be added to the scores so this mean is adjusted to a score of 75 (97.5 on the final). If the mean is 75 or more, no points are added to the scores. You must bring a photo ID to each exam and you may use a calculator on the exams.

Exam, Quiz and Attendance Policy: It is very important to take each exam on schedule. Missed work may be made up only due to illness with medical documentation or for other unusual (documented) circumstances. (See your Student Rights and Responsibilities <http://www.uky.edu/StudentAffairs/Code/>). Students who have university excused absences or who have university-scheduled class conflicts with uniform examinations may arrange with their instructor to take the exam at an alternate time. Work-related conflicts are neither university excused absences or university-scheduled absences. If you miss an exam, you receive a zero. You will be eligible for a make-up only if you present a valid excuse to me before the exam. If you cannot find a reasonable arrangement for a make-up, contact the department DUS Russell Brown. If you miss 4 recitation sections your cumulative score drops by 10%, i.e., from A to B. If you miss 5 recitation sections your cumulative score drops 15%; if you miss 6 recitation sections you lose 20%, e.g., A to C. If you miss 7 or more recitation sections you get an E. This policy begins the week of Jan. 21, 2008

Excused Absences: S.R. 5.2.4.2 defines the following as acceptable reasons for excused absences:

1. serious illness;
2. illness or death of family member;
3. University-related trips;
4. major religious holidays;
5. other circumstances you find to be "reasonable cause for nonattendance."

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day for adding a class. Information regarding dates of major religious holidays may be obtained through the religious liaison, Mr. Jake Karnes (257-2754).

Cheating: Cheating will not be tolerated, and you are responsible for knowing University policy on cheating. The University's minimum policy for cheating is failure in the course. (Yes, the chair of the department does spend time each semester prosecuting students who thought they'd never get caught!) Cheating can lead to expulsion from the university. For a complete description of University policies on excused absences, cheating, and student responsibilities see UK's New Academic Offenses Policy can be found at

<http://www.chem.uky.edu/research/grossman/acadoffenses/index.htm>

For instance, Senate Rule 6.4.11 states:

The minimum penalty for an academic offense is an E in the course in which the offense took place. The repeat option may not be used to remove an E given for an academic offense. If a prior academic offense has been recorded in the Registrar's Office, the minimum penalty shall be suspension for one semester (or a minimum of four months in those colleges in the Medical Center where the semester system is not in use. Penalties more severe than the minimum may be imposed where warranted by the circumstances.

Our class is a cell phone-free zone. Cell phones must be off & out of sight for the entire class period.

Important Dates

August 27 (Wed.)..... First day of classes
September 1 (Mon.)No classes – Labor Day
September 3 (Wed.) Last day to add a class
September 17 (Wed.)....Last day to drop a class without a grade
October 3 (Fri.)..... Examination 1
October 20 (Mon.)Midterm
November 4 (Tues.)..... No classes –Election Day
November 7 (Fri.)..... .Last day to withdraw from a class
November 26-29 (Wed.-Sat.)..... No classes-Thanksgiving
November 14 (Fri.)Examination 2
December 12 (Fri.) Last day of classes
December 17 (Wed) 0800 – 1000 am Final Examination

Note: There is an official procedure for dropping a course. You haven't withdrawn if you simply quit attending. A student who drops a class before February 5 will receive no grade. A student who withdraws after February 5 will receive a grade of W. After March 7 no student will be allowed to withdraw unless his/her dean determines that unusual circumstances merit the withdrawal.