MATH 552 University of South Carolina
D. Meade Fall 1999

MATH 552 – Applied Complex Analysis

Instructor	Professor Doug Meade
Office	LeConte College 300E
Phone	777-6183
E-mail	`meade@math.sc.edu`
WWW URL	`http://www.math.sc.edu/~meade/math552-F99/`
Meeting Times	MWF 12:20PM– 1:10PM, LeConte College 401A
Office Hours	MTuW 10:00–11:00 and by *prior* appointment
Text	Saff and Snider, *Fundamentals of Complex Analysis for Mathematics, Science, and Engineering*, Prentice–Hall, 1993.
Prerequisite	Completion of Math 241 with a grade of C or better; or consent of the Mathematics Department.
Course Content	The majority of the semester will be spent understanding the first five chapters of the text. Additional material will be included as time permits.

Overview

Complex numbers are often first encountered in the quadratic formula. For some people that may be their only use of complex numbers; others may have seen other algebraic uses of complex numbers, *e.g.*, to find the three cube roots of 1. Algebraic and geometric aspects of complex numbers are contained in Chapter 1.

The real emphasis will be on the analysis of functions whose domain and/or range are sets of complex numbers. Much of this analysis will be very similar to the real-valued calculus that is the prerequisite for this course. Chapter 2 builds upon familiar differentiation and integration techniques to introduce and study "analytic functions".

Another objective is to define versions of elementary functions when the argument is a complex number. The "new" functions should be consistent with their real-valued counterparts and should maintain all of the usual properties. For example, $\cos^2 z + \sin^2 z = 1$ for any complex number z. This study will uncover some surprising connections between the exponential and trigonometric functions. Another interesting fact that will be found is that $e^{\pi i} = -1$.

The Cauchy Integral Theorem, developed in Chapter 4, is one of the major triumphs of complex analysis. This theorem can be viewed as an extension of Green's Theorem (which provides a connection between double integrals and line integrals). One of the most important applications of the Cauchy Integral Theorem is the easy evaluation of many contour (line) integrals.

The techniques of complex analysis are applied to sequences and series in Chapter 5. While these are familiar topics, they are significantly more powerful — and somewhat simpler — than the real-valued versions encounterd in calculus.

Grading Your grade in this course will be based on your performance on homework assignments, 2 mid-term exams, and a final exam. The weights assigned to each of these components will be:

Homework	25%
Mid-term exams (2)	50%
Final exam	25%

Course grades will be determined according to the following scale:

A	90 –100
B	80 – 89
C	70 – 79
D	60 – 69
F	0 – 59

Note that the deadline to drop this course with a grade of W is Thursday, September 30, 1999.

Exams The two (2) mid-term exams will be given in class. *Tentative* dates for these exams are:

Wednesday, September 22
Monday, November 22

Make-up exams will be given only for documented reasons of illness, family emergency or participation in a University sponsored event. Excuses such as oversleeping, forgetting the time or location of the exam, and lack of studying are explicitly noted as unacceptable grounds for the administration of a make-up exam.

A comprehensive final will be given at 2:00P.M. on Thursday, December 9, 1999.

Homework Assigned problems will be collected weekly, typically on Monday. Homework will be graded and returned as quickly as possible. Your homework grade will be determined by your nine (9) highest homework scores. *No late homework will be accepted.*

Study Hints Before each class, you should both review the material from recent sections and read the section to be discussed that day. This will allow you to both understand and participate in the presentation of new material and identify questions that you need to resolve before completing the homework.

Attendance Regular class attendance is important. Consistent with the USC Undergraduate Bulletin, a grade penalty may be applied to any student missing more than five classes (10%) during the semester.

Academic Honesty Cheating and plagiarism will not be tolerated in this course. You may discuss homework problems with others, but do not copy solutions from another student or from a book. Violations of this policy will be dealt with in a matter consistent with University guidelines.