MATH 5583, COMPLEX ANALYSIS, FALL 2008

Location: 10:10 to 11:00, MWF; VH207

Lecturer: Professor Al Marden, am@math.umn.edu
Office hours: MW 1:10-2:00, and by appt. VH 326, 625-5879(voicemail)
Grader: to be assigned

Text: Brown, Churchill: Complex Analysis with Applications, 7th ed.

Prerequisites. Two years of calculus.

Overview. This course is an introduction from scratch to the theory of complex analysis. Complex numbers have proved to be an essential tool in many applications in engineering and physics. In mathematics itself, it is one of the foundational subjects, as it has extensive ramifications in algebraic geometry, number theory, functional analysis, not to say string and superstring theory in physics, and many other subjects. For the last 200 years or so, as today, complex analysis itself is a large and active field of research in mathematics.

We will get some glimpses of the scope of the theory in this course. However this course is not intended as a "theory' ' course. But we will want to get some understanding of why formulas and other statements are valid. For the most part, we will stick to the mathematics, leaving the engineering and physics applications to your courses in those subjects

Topics to be covered. We will cover the first seven chapters (perhaps skipping some individual topics along the way). As time allows we will pursue some topics in Chapters 8, and 9.

Complex analysis is one of my fields of expertise, and I may digress from time to time to tell you about some cool stuff.

Coursework.

Roughly, I plan take on a new chapter every two weeks. How fast I go depends on you. If you are willing to participate in the course by asking questions in class and expressing skepticism about what you don't understand, it will make the class better for everyone, and that includes me. Especially if matters start getting complicated, you might want to ask, "What is this good for, anyway?"

We will have no fixed schedule but if you read 5 -10 pages beyond what we cover in one class, you will get all the more out of the next one.

I will assign homework from the problems in the book every Friday, and they will be due the following Friday, assuming we have a grader for the course. What problems I assign will depend on what we have covered the past week and expect to cover at the beginning of the next week. Therefore I cannot produce in advance a schedule of problems. The grader will grade a subset of the assigned problems.

Late homework will not be accepted. If you cannot be in class, you can put your homework in my mailbox in VH127.

We will have two 50 minute midterm exams and a 2-hour final. The final grade will be 20% on homework, 20% on each of the midterms, and 40% on the final. If you have to miss some of the work, the final will be counted proportionally more. I can give no makeups for work missed.

It is likely that many of the homework problems will reappear as exam problems. The exams will be:

(1) MIDTERM I: Wednesday, October 1.
(2) MIDTERM II: Wednesday, November 12..
(3) **FINAL EXAM:** Scheduled for SATURDAY, Dec. 13; 10:30—12:30.

Further reading. There must be hundreds of complex analysis texts published over the past 200 years. In my opinion, the best graduate text is the one by Lars Ahlfors, who is usually considered to be the foremost complex analyst of the 20th century. When I teach the graduate course, I use that one. A recent encyclopedic text is the one by Gamelin, which will be useful if you want to have a look at the many advanced topics. If you browse in the library, you will find many others, at all levels. This reflects the fact that fascination with the subject is timeless; each generation of mathematicians has made fundamental contributions to it. Today complex analysis encompasses a very large body of discoveries with tentacles all over the scientific world.