Math 311 Methods of Complex Analysis.

Course Policy and Syllabus.

This course is an introduction to the theory of functions of one complex variable. Its emphasis is on techniques and applications, and it serves as a basis for more advanced courses. Material covered includes: functions of a complex variable and their derivatives; power series and Laurent expansions; Cauchy integral theorem and formula; calculus of residues and contour integrals; harmonic functions.

A working knowledge of the principles of complex analysis is an indispensable part of the formation of any scientist or engineer. The central concepts of ”analytic function” and ”conformal mapping” are two faces of the same coin and the interplay between analysis and geometry makes the subject extremely rich in applications. One can use the properties of these functions to easily compute integrals for which standard real-variable methods fail, to generate beautiful fractal figures and to study the ”harmonic functions” that appear when dealing with such diverse problems as the steady-state temperature of a plate, nonviscous fluid flow or electrostatic charge distribution. Although fully exploring the richness of applications of the subject is beyond the scope of a first course it is hoped that the ones we present will serve as enticing highlights.

The basic prerequisites for this course are calculus of two variables including line integrals and Green’s theorem. However, I will try hard to keep the course self-contained.

I expect to cover Chapters 1-6 of Saff and Snider:

1. Complex Numbers: sections 1.1-1.5 ; 2 lectures
2. Analytic functions: sections 2.1-2.6; 3 lectures
3. Elementary functions: sections 3.1-3.5; 3 lectures
4. Complex Integration: sections 4.1-4.7; 6 lectures
5. Power Series: sections 5.1-5.7; 4 lectures
6. Residue theory: sections 6.1-6.5, 6.7; 6 lectures

Your grade will be based on 10 Homework Assignments(30%), 1 Midterm(30%) and a comprehensive Final Exam(40%). Homework will be collected in class on Thursdays and late homework will not be accepted. There will be no makeup exams for the midterm or final. If you miss the midterm, your grade will be based on your homework and final exam scores. The following is a summary of the University policy on Academic Ethics:

"Undergraduate students enrolled in the Krieger School of Arts and Sciences or the Whiting School of Engineering at the Johns Hopkins University assume a duty to conduct themselves in a manner appropriate to the University’s mission as an institution of higher learning. Students are obliged to refrain from acts which they know, or under circumstances have reason to know, violate the academic integrity of the University.

Ethical violations include cheating on exams, plagiarism, reuse of assignments, improper use of the Internet and electronic devices, unauthorized collaboration, alteration of graded assignments, forgery and falsification, lying, facilitating academic dishonesty, and unfair competition.

Report any violations you witness to the instructor. If a student is found responsible through the Office of Student Conduct for academic dishonesty on a graded item in this course, the student will receive a score of zero for that assignment, and the final grade for the course will be further reduced by one letter grade.

In this course, you may discuss homework problems with other students (and me) but you must write up the assignments yourself. I will post old exams and practice exams to help you succeed in the course.

On every exam, you will sign the following pledge: "I agree to complete this exam without unauthorized assistance from any person, materials or device. [Signed and dated]"

For more information, see the guide on “Academic Ethics for Undergraduates” and the Ethics Board web site (https://studentaffairs.jhu.edu/policies-guidelines/undergrad-ethics/).