

MATH 523 Section 001 Spring 2020
Functions of a Complex Variable with Applications

MWF 9:05 - 9:55, Phillips 383

INSTRUCTOR: Prof. Alexander Varchenko, Phillips 304, anv@email.unc.edu

GRADER: Bechtold, Benjamin, benbech@live.unc.edu, Ph. 416

OFFICE HOURS: Monday, 10:00-11:00, also by appointment

TEXTBOOK: Complex Variables by S.D. Fisher, Second Edition, Dover Books on Mathematics, ISBN-10: 0486406792, ISBN-13: 978-0486406794

HOMEWORK will be assigned regularly at <https://varchenko.web.unc.edu/math-523/> and turned in once each week after class on Monday (no late homework will be accepted)

MIDTERM EXAMS: First - Friday, February 14, Second - Friday, March 27
(no make-up exams)

FINAL EXAM: Monday, May 4, 8:00 A.M.
(there are no make-ups for final exams, except by petition to the Dean)

GRADING: Homework (20%), In-Class 50-min Tests (20+20%), Final Exam (40%)

CURVE: I expect that 60% would suffice for a D, 70% for a C, 80% for a B, and 90% for an A. I expect that less than 60 will imply an F

SYLLABUS: Complex plane, basic properties of analytic functions, analytic functions as mappings, harmonic functions

COURSE GOALS: Learn properties of the exponential, logarithm, and trigonometric functions as holomorphic functions. Learn residues with applications to the evaluation of definite integrals. Learn the notions of the analytic continuation and basics of the theory of conformal mappings. Learn the properties and applications of harmonic functions

You will need to **read the book** (we will cover Chapters 1-3 and some topics in Chapter 4 if time permits) and **review your class notes** regularly. It is also very important that you work many problems every week **beyond the hand-in homework** assignments. Group study is encouraged; questions in class are also encouraged. The midterm and final exams are closed book exams (you are not allowed to use textbooks or notes or anything else besides your brain)

No laptops or electronic devices are allowed in class

HONOR SYSTEM: "It is expected that each student in this class will conduct him or herself within the guidelines of the Honor System. All academic work should be done with the high level of honesty and integrity that this University demands"

PREREQUISITE: MATH 383

CHANGES: In the event of unforeseen circumstances (such as an epidemic), the professor reserves the right to make changes to the syllabus. Such changes are unlikely, but if they must be made, students will be notified as soon as possible.

KEY DATES: Monday, Jan. 20, No Classes Held (Dr. Martin Luther King, Jr. Day); Friday, Mar. 6 - Monday, Mar. 16 (Spring Break); Friday, Apr. 10, No Classes Held (Holiday); Friday, Apr. 24 (Classes End)

DESCRIPTION: Time permitting, the chapters and topics that will be covered are as follows:

Chapter 1: Functions and limits; the exponential, logarithm, and trigonometric functions, line integrals and Green's theorem

Chapter 2: Analytic and harmonic functions; the Cauchy-Riemann equations; power series; Cauchy theorem and Cauchy formula; isolated singularities; the residue formula

Chapter 3: The zeros of an analytic function; maximum modulus and mean value; linear fractional transformations, conformal mapping

Chapter 4: Harmonic functions