FALL 2026 3 CREDIT HOURS

MATH 4320: Complex Analysis

Sections A and B

Dr. Benjamin Jaye

Section	Meeting days	Time	Room
A (AU/AG)	Monday and Wednesday	12:30–1:45 p.m.	Skiles 268
B (BU/BG)	Monday and Wednesday	2:00–3:15 p.m.	Skiles 268

Instructor Information

Instructor Dr. Benjamin Jaye
Email bjaye3@gatech.edu
Office hours See Canvas for an announcement during the first week

General Course Information

Description

Complex analysis begins with differentiation in the complex plane and quickly leads to a strikingly rigid and beautiful theory. This course develops its basic ideas, with Cauchy's theorem as a central organizing result.

Topics include:

- Geometry of the complex plane, triangle inequalities, and a geometric proof of the Fundamental Theorem of Algebra.
- Analytic functions: continuity and differentiability, the Cauchy–Riemann equations, and complex functions as maps of the plane into itself.
- Elementary analytic functions, including the logarithm and its principal branch, $\log z$.
- Contour integrals, the Cauchy–Goursat theorem, the Cauchy integral formula, and Morera's theorem.
- Taylor and Laurent series and their regions of convergence.
- Residue calculus and its application to definite integrals.
- Harmonic and analytic functions: harmonic conjugates, conformal invariance of Laplace's equation in the plane, and conformal maps.
- The Poisson kernel derived from Cauchy's formula, boundary value problems for Laplace's equation solved by conformal mapping, and selected applications.

Course Learning Outcomes

- Explain complex differentiability and its consequences.
- Compute Taylor and Laurent series expansions of functions analytic on regions of the complex plane, and determine their regions of convergence.
- Evaluate definite integrals using the residue calculus.
- Use conformal transformations to solve problems, including boundary value problems for Laplace's equation.

Required Course Materials

James Ward Brown and Ruel V. Churchill, *Complex Variables and Applications*, 9th edition, McGraw-Hill.

Grading Policy

The final grade will be determined by the following weighted components.

Component	Weight
Weekly homework	**15%**
Two in-class midterms	**60%**
Four in-class quizzes	**20%**
Class project	**5%**
Total	**100%**

Description of Graded Components

Homework

Homework will be assigned weekly except during exam weeks. Assignments are due on Wednesdays at 11:59 p.m. and must be submitted as a single PDF through Canvas. Each assignment will contain five or six problems. Submit three problems for grading; these will be graded lightly, with feedback focused on any significant issues. The two lowest homework scores will be dropped from the homework average.

Quizzes

There will be four in-class quizzes. They will focus on a skill I find essential when using AI in day-to-day mathematical exploration: identifying and correcting errors. Homework problems in the style of the quizzes will be provided. The lowest quiz score will be dropped from the quiz average.

Exams

There will be two in-class midterm exams and an in-person final exam. At least 50% of each exam will consist of questions based on homework assignments. Of the two midterm scores, the higher will contribute 75% of the combined midterm score and the lower will contribute 25%.

Class Project

A report exploring a topic considered in class in greater depth will be worth 5% of the final grade. It will be due after Thanksgiving; further details will be provided later in the semester.

Course Policies

Attendance and Participation

Attendance in class is an important component of the learning process and, therefore, I expect students to attend whenever possible. Make-up quizzes will be given only in cases of documented illness or university-approved travel. There will be no homework extensions, since the two lowest homework scores will be dropped. However, if a documented illness prevents an assignment from being completed, then additional homework assignments may be dropped from the homework average. In such cases, it is still important to work through the assignment, since the material may appear on a midterm or the final exam.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also email me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgment, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.