

Complex Analysis

Spring 2025

Course	MAT 452
Instructor	Krishnendu Khan Office: 323 Neville Hall krishnendu.khan@maine.edu
Schedule	MWF 10:00 AM to 10:50 AM Neville Hall 208
Text	A First Course in Complex Analysis -Beck, Marchesi, Pixton, Sabalka - (free)

Syllabus

We'll roughly go over:

- Complex Numbers
- Differentiations
- *Möbius* Transformation
- Line Integrals
- Cauchy's Theorem
- Harmonic Functions
- Power Series
- Laurent Series
- Isolated Singularities
- Residues

Grading

Homework-40%

Exams- 60%

Midterm 1 (TBD)

Midterm 2(TBD)

Final Exam(TBD)

Description: We'll go through functions over complex numbers, define the notion of derivatives and integrals. We'll see a proof of the fundamental theorem of algebra along the way. Using complex analysis, we'll be computing sums of many interesting infinite series such as:

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}, \quad \sum_{n=1}^{\infty} \frac{1}{n^4} = \frac{\pi^4}{90}, \quad \sum_{n=1}^{\infty} \frac{(-1)^n}{(2n+1)^3} = \frac{\pi^3}{32}.$$

