

# Math 300: Introduction to Complex Variables

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## Instructor information

- Instructor: [Richard Froese](#)
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  - Office: Math Annex 1106
  - Hours: M: 1pm W,F: 9:00am
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## Location and Time

MWF 8:00-9:00 in [BUCH 102](#)

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## Textbook

This year we will use the free online textbook

[\*A First Course in Complex Analysis\*](#) by Beck, Marchesi, Pixton and Sabalka.

You can also refer to

*Fundamentals of Complex Analysis with Applications to Engineering and Science (Third Edition)*, by E. Saff and A. Snider.

## Topics

### 1.The Algebra and Geometry of Complex Numbers

- definition of complex numbers
- conjugate, modulus and argument
- rectangular and polar form.
- description of planar sets
- roots of unity, roots of a complex number.
- topology of planar sets.

### 2.Differentiating Complex Functions

- limits and continuity
- differentiability, holomorphicity (=analyticity) and the Cauchy Riemann equations

### 3.Examples of Complex Functions

- polynomials and rational functions
- complex exponential and trig functions
- complex logarithm

### 4.Complex Integration

- definition and basic properties
- Cauchy theorem
- Cauchy integral formula
- some consequences

## 5. Harmonic Functions

- mean value property
- maximum modulus principle

## 6. Power Series

- sequences and series of complex numbers
- sequences and series of functions
- regions of convergence

## 7. Taylor and Laurent series

- power series and analytic functions

## 8. Isolated singularities and the Residue theorem

- classification of singularities
- residues
- argument principle and Rouché's theorem

## Homework, tests and grades

There will be weekly homework assignments, usually due on Mondays. You will be required to upload files in pdf format (either scanned handwritten solutions, or prepared with a typesetting program such as LaTeX) on the course canvas page. A selection of problems will be graded. Late homework will not be accepted, even if you have a good excuse. To compensate, I will drop the lowest homework score. Even if you miss the deadline, it's a good idea to do the problems, since this is the best way to prepare for the tests and exam. You are welcome to discuss the homework problems with your friends, but are expected to hand in your own work.

There will be two midterm exams on **October 5** and **November 9** in class and a final exam during the exam period.

The following weightings will be used in computing your final grade:

Homework (lowest score dropped):	10%
Midterms:	2 x 20%
Exam:	50%

If you miss the test for a legitimate reason (e.g., illness with doctors note), the weight of the final exam will be increased.