EMORY UNIVERSITY

College of Arts and Sciences
Department of Mathematics

MATH 318 – Complex Variables (Fall 2025)

(as of July 1, 2025)

Land Acknowledgement

Emory University acknowledges the Muscogee (Creek) people who lived, worked, produced knowledge on, and nurtured the land where Emory's Oxford and Atlanta campuses are now located. In 1821, fifteen years before Emory's founding, the Muscogee were forced to relinquish this land. We recognize the sustained oppression, land dispossession, and involuntary removals of the Muscogee and Cherokee peoples from Georgia and the Southeast. Emory seeks to honor the Muscogee Nation and other Indigenous caretakers of this land by humbly seeking knowledge of their histories and committing to respectful stewardship of the land.

Instructor: Dr. Manuela Girotti and Dr. Shanshuang Yang

Office: Math & Science Center, room E416

Email: `manuela.girotti@emory.edu`

Please put "MATH 318" in the subject line, use the *plain text format*, and make sure that you are clearly identified (first and last names). I do not answer anonymous email. I make every effort to answer by the first business day after receiving an email.

Lectures:

Tuesday and Thursday 11:30am–12:45pm
Math&Science Center, room E301A

Office hours: – *Ask-Me-Anything* hours –

(tentatively)
Tuesday and Thursday 2:30pm–4:30pm
or by appointment

Prerequisites: Multivariable calculus, Foundations of Math, Honors Vector Calculus (MATH 211, MATH 250, MATH 276, or equivalent).

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Overview: This course will deal with the theory of complex valued functions of one complex variable $w = f(z)$. It will cover chapters 1-7 of the textbook.

The main topics will be the following:

- algebra and geometry of complex numbers,
- analytic functions,
- complex integration,
- power series,
- residue and its applications.

A diary of the lectures will be regularly kept on the Canvas calendar with the material covered in each class. Please, refer to that when preparing for the final exam or in case of missed class, because that will be the official and ultimate syllabus for the class.

Learning outcomes: At the end of the semester students will be able to

- understand the geometric and topological structure of the complex plane,
- have a deep understanding and be able to apply the Cauchy integral formula for analytic functions,
- have a deep understanding of the residue theory and its applications,
- explain the essential differences between complex differentiable functions and real differentiable functions.

Textbook: *Complex Variables and Applications* by Brown and Churchill, 9th edition.

Evaluations: The course mark will be calculated as follows:

25% homework,
5% class participation,
15% 1st midterm exam,
15% 2nd midterm exam,
40% final exam.

Final letter grades are assigned according to the ECAS Catalog:

Grade	F	D	D+	C-	C	C+	B-	B	B+	A-	A
Mark	0-62.99	63-66.99	67-69.99	70-72.99	73-76.99	77-79.99	80-82.99	83-86.99	87-89.99	90-92.99	93-100

Homework: You will be required to hand in about 11 assignments along the semester (approximately one every week).

The assignment should be produced using LaTeX. A template for the submission will be provided for each assignment on Canvas and on Gradescope. You can use the following online tools for typing on it:

- https://www.overleaf.com/edu/emory
- https://latexbase.com/

You will then need to upload your homework on Gradescope.
Late assignments can still be submitted, but they will receive a 10% deduction for each 24-hour period the assessments are submitted over the specified date and time (or part thereof).
A few things to remember:

- Assignments are very important! Taking them seriously and doing them well is by far the best way to learn.

  Make sure that you start working on them well before the deadline. One day will usually not be enough. You should at least read the questions on the day the assignment is posted. Before you attempt a question write out relevant definitions and results.

  Do not hand in your rough work. Always use full sentences and provide justification for your answers, or you will receive no partial credit.

- Discussions and work group are highly encouraged!

  However,

  (a) **Acknowledge** all people you worked with or got help from (e.g., I worked with John Smith on Problems 2, 3, 5, and got additional help from Jane Doe on Problems 1, 3 and 4.).
  You must also properly acknowledge all other sources you got help from (e.g., textbooks and online sources, like Mathoverflow). If you find a solution somewhere online make sure that the acknowledgement is very precise; in particular this means that you must provide the *exact web address* for each problem (or part of a problem).

  (b) **Write** out the solutions in your own words and on your own (if you work in groups you are not allowed to produce template from which you all copy). Do not just copy from a book or an online source.

- (c) Do not submit anything that you do not **understand**! I reserve the right to quiz you on any part of the assignment you submit.

Exams: There will be two Midterm Exams and the Final Exam.

The midterm exams will be written in class, during scheduled times. It will tentatively take place during Week 6 and Week 13. The exact date and contents of the midterm will be communicated at least 10 days in advance. Date for the final exam will be scheduled by the university registrar. The final exam will cover material from the entire course.

Notes, books, or electronic devices may not be used when taking the exams.

Missed tests: Make-up midterm exams will not be given. If you miss the midterm exam due to unavoidable, compelling, and well-documented circumstances, the exam will be excused and your other exams will be weighted more heavily. Make-up final exams will be given only in extreme situations, with justification verified by the Office of Undergraduate Education (OUE).

Extra help: Do not hesitate to come to my office during office hours or by appointment to discuss a homework problem or any aspect of the course.
You may also want to check the Academic Success Program for resources to succeed in the course!

Accommodation: Emory University is committed to providing reasonable accommodations for all persons with disabilities. Students with disabilities who need accommodations shall contact the Department of Accessibility Services to learn more about the registration process and steps for requesting accommodations.
Students who have accommodations in place are encouraged to coordinate with the instructor during the first week of the semester to communicate your specific needs for the course.

Academic Integrity:

This course will adhere to the Emory University Academic Honor Code
http://catalog.college.emory.edu/policies/honor-code.html

Students are expected to do their own work during tests and exams. The following activities, although not exhaustive, are examples of activities that are prohibited:

- Copying from another student;
- Allowing another student to copy from you;
- Using unauthorized aids, including: sheets, cell phones and calculators, during test or exam;
- Getting aid from or giving aid to another student during tests and exams;
- Having another student write for you or writing for another student.

Offenders will be subject to discipline. In particular, cheating may be reported to both the student's college and the Honor Council.

An incident of academic dishonesty can have extremely negative consequences: it could delay or bar a student from graduating or even affect job opportunities.

This course is a precious opportunity for you to learn something new and valuable. It's an investment on your future. Failing to acquire it will sadly be your loss.

(Tentative) course calendar:

Week	Topic	Important dates
1 (Aug 26th)	Welcome! 1. Complex numbers, part I (Sec. 1–5).	
2 (Sep 2nd)	1. Complex numbers, part II (Sec. 5–9). 1. Complex numbers, part III (Sec. 10–12)	Sep 1st – *Labour Day*
3 (Sep 9th)	2. Analytic functions, part I (Sec. 12–14) 2. Analytic functions, part II (Sec. 14–17)	Sep 10th – course add/drop/swap deadline
4 (Sep 16th)	2. Analytic functions, part III (Sec. 18–20) 2. Analytic functions, part IV (Sec. 21–26)	
5 (Sep 23rd)	3. Elementary functions, part I (Sec. 30–32) 3. Elementary functions, part II (Sec. 33–35)	
6 (Sep 30th)	3. Elementary functions, part III (Sec. 36–40) Midterm #1	
7 (Oct 7th)	4. Integrals, part I (Sec. 41–44) 4. Integrals, part II (Sec. 45–47)	
8 (Oct 14th)	4. Intergrals, part III (Sec. 48-49)	Oct 13th-14th – *Fall break*
9 (Oct 21st)	4. Integrals, part IV (Sec. 50–59)	
10 (Oct 28th)	5. Series, part I (Sec. 60–67) 5. Series, part II (Sec. 68–73)	Oct 29th – course withdrawal and change in grading basis
11 (Nov 4th)	6. Residues and poles, part I (Sec. 74–77)	
12 (Nov 11th)	6. Residues and poles, part II (Sec. 78–84)	
13 (Nov 18th)	7. Applications of residues, part I (Sec. 85–90) Midterm #2	
14 (Nov 25th)	7. Applications of residues, part II (Sec. 91–92)	Nov 26th-28th – *Thanksgiving recess*
15 (Dec 2nd)	7. Applications of residues, part III (Sec. 93–95)	
16 (Dec 9th)	Review & Conclusions.	

Disclaimer: this syllabus is subject to change and revision, as needed, to meet the learning goal of the course. Necessary revisions will be announced in class and course materials will be updated.