

## Introduction to Functions of One Complex Variable

Math 4520.001/5400.001, Fall 2021, MWF 10:00-10:50, Matthews 114

**Professor:** Dr. Conley, GAB 419, conley@unt.edu. Assignments and announcements will be posted at [www.math.unt.edu/~conley](http://www.math.unt.edu/~conley).

**Office Hours:** MW 11:15-12:45, F 11:30-12:30

**Text and Prerequisites:** The text is *Complex Analysis for Mathematics and Engineering*, sixth edition, by Mathews and Howell. The prerequisites are Math 1710-20 and 2730, the calculus sequence.

**Exams:** There will be two 100 point midterms, on the Wednesdays of September 29 and November 3, and a comprehensive 180 point final on Saturday, December 4, 8:00-10:00. There will be no make-up exams.

**Homework:** There will be thirteen problem sets, usually worth 10 points and due Fridays at the beginning of class: see the calendar for details. Homework must be handwritten, and late homework will not be accepted.

**Grading:** Grades will be based on your total score in the course. There are 500 points possible altogether. The percentage necessary for each letter grade will not be 90/80/70/60 — the curve will be more generous than that. After each exam I will announce the curve on all points available up to through exam, so you know how you are doing as the course progresses.

**Math 5400 Students:** Graduate students enrolled in 5400 will be given some extra weekly problems, and possibly an extra problem on each exam.

**Disabled Students:** Please tell me about your disability after the first lecture.

**Topics:** We will begin by going over multiplication of complex numbers in rectangular and polar coordinates. Then we will study differentiability of functions of one complex variable, followed by Taylor and Laurent series and contour integration. We will also discuss conformal maps and Julia and Mandelbrot sets if time permits. We will give some rigorous proofs, but no prior exposure to proofs will be assumed. Concrete examples and calculations will be emphasized.

*Chapters 1-2:* Complex numbers, functions, and graphs.

*Chapters 3-5:* Analytic and harmonic functions, power series functions, and the elementary functions such as  $e^z$ .

*Chapters 6-8:* Complex integration, contour integration, and Taylor and Laurent series. These chapters contain many surprising and beautiful theorems and form the centerpiece of the course.

**Problem Set 1** (due Friday, August 27):

*Section 1.2:* 1abef, 2cfh, 3, 5ac, 6

*Section 1.3:* 1, 2a, 3b, 5, 6ab, 9, 11, 12

*Section 1.4:* 1abdeh, 2b, 3abcd, 5fg

Additional problems for 5400 students: 1.3.18, 1.4.4, 1.4.8

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MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8/23	8/24	8/25	8/26	8/27 HW 1 (5 points) Last day to add or swap
8/30	8/31	9/1	9/2	9/3 HW 2 (10 points)
9/6 Labor Day	9/7	9/8	9/9	9/10 HW 3 (10 points)
9/13	9/14	9/15	9/16	9/17 HW 4 (10 points)
9/20	9/21	9/22	9/23	9/24 HW 5 (10 points)
9/27	9/28	9/29 Exam 1 (100 points)	9/30	10/1
10/4	10/5	10/6	10/7	10/8 HW 6 (10 points)
10/11	10/12	10/13	10/14	10/15 HW 7 (10 points)
10/18	10/19	10/20	10/21	10/22 HW 8 (10 points)
10/25	10/26	10/27	10/28	10/29 HW 9 (10 points)
11/1	11/2	11/3 Exam 2 (100 points)	11/4	11/5
11/8	11/9	11/10	11/11	11/12 HW 10 (10 points) Last day to drop
11/15	11/16	11/17	11/18	11/19 HW 11 (10 points)
11/22	11/23	11/24 HW 12 (5 points)	11/25 Thanksgiving	11/26 No classes
11/29	11/30	12/1 HW 13 (10 points)	12/2	12/3 Reading Day: no class
12/6	12/7	12/8	12/9	12/10

Final Exam (180 points, comprehensive): Saturday, December 4, 8:00-10:00