MAT 349 Functions of a Complex Variable

Summer 2024

Course Credits: 4
Contact Hours: 56 hours
Instructor: TBA
Email: TBA

COURSE OBJECTIVES

This course is the branch of mathematical analysis that analyses functions of complex numbers. The topics included are: complex numbers, differentiation of complex functions, Cauchy-Riemann equations, analytic functions, Cauchy's theorem and the Cauchy integral formula, Taylor series and Laurent series, singularities, residues, analytic continuation.

Upon Completion of this Course, students will be able to:

1. Gain deeper knowledge of the theory of analytic functions of a complex variable, and its broad applicability;
2. Understand the relevance and broad importance of the theory of analytic functions;
3. Grasp the techniques from Cauchy-Riemann equations, power series expansion and Cauchy integral formulas to study analytic functions from different perspectives;
4. Learn how to apply the knowledge of analytic functions to problems in applied mathematics, science and engineering.

PREREQUISITES

MAT 225 Real Analysis

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM	POINTS
5 Assignments	30 Points
2 Quizzes	20 Points
Midterm Exam	20 Points
Final Exam	30 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F$.

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Brown and Churchill, ***"Complex Variables and Applications"***, 9thedition, McGraw Hill (2014).

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	**Topics:** Topic 1: Complex Numbers Topic 2: Products and Powers in Exponential Form Topic 3: Arguments of Products and Quotients Topic 4: Roots of Complex Numbers **Assessments:** Assignment #1
Module 2	**Topics:** Topic 5: Theorems on Limits Topic 6: Continuity/Derivatives/Rules for Differentiation Topic 7: Cauchy–Riemann Equations Topic 8: Harmonic Functions **Assessments:**

	Assignment #2 Quiz #1
Module 3	**Topics:** Topic 9: The Exponential Function/The Logarithmic Function Topic 10: The Power Function Topic 11: Zeros and Singularities of Trigonometric Functions Topic 12: Hyperbolic Functions **Assessments:** Assignment #3 Midterm Exam
Module 4	**Topics:** Topic 13: Derivatives of Functions w(t) Topic 14: Contour Integrals Topic 15: Cauchy–Goursat Theorem Topic 16: Liouville's Theorem and the Fundamental Theorem of Algebra **Assessments:** Assignment #4
Module 5	**Topics:** Topic 17: Convergence of Sequences/Convergence of Series Topic 18: Taylor Series Topic 19: Laurent Series Topic 20: Integration and Differentiation of Power Series **Assessments:** Assignment #5 Quiz #2
Module 6	**Topics:** Topic 21: Residues and Poles Topic 22: Cauchy's Residue Theorem Topic 23: Mapping by Elementary Functions Topic 24: Conformal Mapping **Assessments:** Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow

University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

1) Late assignments are not acceptable and are subjected to grade deductions.
2) Assignments submitted in the wrong format will be counted as not submitted.
3) Failure to submit or fulfill any required course component results in failure of the class.
4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACEDEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.