Spring 2024

MATH 332-002: Intro Complex Variables

T. Askham

MATH 332: Introduction to Functions of a Complex Variable
Spring 2024 Course Syllabus

NJIT Academic Integrity Code: All Students should be aware that the Department of Mathematical Sciences takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

Please be sure you read and fully understand our DMS Online Exam Policy.

COURSE INFORMATION

Course Description: Functions of a complex variable: Cauchy-Riemann equations, Cauchy-Goursat theorem, integration, series, residues, poles, geometrical aspects. Emphasis on techniques. Effective From: Fall 2010.

Number of Credits: 3

Prerequisites: MATH 211 or MATH 213 and MATH 222 all with a grade of C or better

Course-Section and Instructors:

Course-Section	Instructor
Math 332-002	Professor T. Askham

Office Hours for All Math Instructors: Spring 2024 Office Hours and Emails

Required Textbook:

Title	*Complex Variables and Applications*
Author	Brown
Edition	9th
Publisher	McGraw-Hill
ISBN #	978-0073383170

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, April 1, 2024**. It will be strictly enforced.

COURSE GOALS

Course Objectives

- Understand the relevance and broad importance of the theory of analytic functions.
- Learn the meaning of theorems and corollaries describing important properties of analytic functions.
- Learn the connection between the series representations and integration properties of analytic functions.
- Learn applications of the Cauchy Residue Theorem, and its use in calculating certain definite integrals.
- Learn how to apply knowledge of analytic functions to problems in applied math, science and engineering.

Course Outcomes

- Students gain knowledge of the theory of analytic functions of a complex variable, and its broad applicability.
- Students gain a deeper understanding of common elementary transcendental functions through the knowledge of their properties in the complex plane.
- Students are prepared for further study in more advanced mathematics, science and engineering courses.
- Students can apply their knowledge of the theory of analytic functions to solve problems in applied mathematics, fluid dynamics, electrodynamics, and other areas of science and engineering.

Course Assessment: The assessment of objectives is achieved through homework assignments, and in-class quizzes, midterm and final examinations.

POLICIES

DMS Course Policies: All DMS students must familiarize themselves with, and adhere to, the Department of Mathematical Sciences Course Policies, in addition to official university-wide policies. DMS takes these policies very seriously and enforces them strictly.

Grading Policy: The final grade in this course will be determined as follows:

Homework: 20% Quizzes: 15%	Midterm Exams: 30%	Final Exam: 35%

A **passing final letter grade** will be based on the following tentative cutoffs:

A	90 - 100	**C+**	66 - 75
B+	82 - 89	**C**	58 - 65
B	74 - 81	**D**	50 - 57

Attendance Policy: Attendance at all classes will be recorded and is **mandatory**. Please make sure you read and fully understand the Math Department's Attendance Policy. This policy will be strictly enforced.

Homework and Quiz Policy: Homework problem sets will be posted on the course canvas page at the end of each week, based on the material covered that week. Late homework will not be accepted. Short quizzes will be given at the end of the class on Tuesdays based on the material covered in the previous week.

Exams: There will be one midterm exam and one comprehensive final exam. The final exam will test your knowledge of all the course material taught in the entire course. Make sure you read and understand the Math

Department's Examination Policy. This policy will be strictly enforced.

Makeup Exam Policy: There will be **NO MAKE-UP EXAMS** during the semester. If an exam is not taken under rare circumstances where the student has a legitimate reason for missing the exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the Math Department Office/Instructor that the exam will be missed.

Cellular Phones: All cellular phones and other electronic devices must be switched off during all class times.

ADDITIONAL RESOURCES

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: Spring 2024 Hours)

Further Assistance: For further questions, students should contact their instructor. All instructors have regular office hours during the week. These office hours are listed on the Math Department's webpage for Instructor Office Hours and Emails.

Accommodation of Disabilities: The Office of Accessibility Resources and Services (OARS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please If you need an accommodation due to a disability please contact the Office of Accessibility Resources and Services at oars@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibility Resources and Services office authorizing your accommodations will be required.

For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Office of Accessibility Resources and Services (OARS) website at:

https://www.njit.edu/accessibility/

Important Dates (See: Spring 2024 Academic Calendar, Registrar)

Date	Day	Event
January 16, 2024	Tuesday	First Day of Classes
January 22, 2024	Monday	Last Day to Add/Drop Classes
March 10, 2024	Sunday	Spring Recess Begins
March 16, 2024	Saturday	Spring Recess Ends
March 29, 2024	Friday	Good Friday - No Classes
April 1, 2024	Monday	Last Day to Withdraw
April 30, 2024	Tuesday	Friday Classes Meet
April 30, 2024	Tuesday	Last Day of Classes
May 1, 2024	Wednesday	Reading Day 1
May 2, 2024	Thursday	Reading Day 2

May 3 - May 9, 2024	Friday to Thursday	Final Exam Period

Course Outline

Date		Sections	Topic
January 16 January 19	1 2	1-5 6-11	Complex Algebra; Vectors & Moduli; Complex Conjugate Polar Representation; Products & Powers in Exponential Form; Roots
January 23 January 26	3 4	12 13-14	Regions in the Complex Plane Functions of Complex Variable; Mappings
January 30 February 2	5 6	15-18 19-23	Limits and Continuity Derivatives & Analyticity; The Cauchy-Riemann Equations
February 6 February 9	7 8	24-26 27-29	Analyticity; Cauchy-Riemann Equations in Polar Coordinates, Harmonic Functions; Uniquely Determined Functions; Reflection Principle
February 13 February 16	9 10	30-36 37-39	The Exponential and Logarithm, The Power Function Trigonometric and Hyperbolic Functions
February 20 February 23	11 12	40 41-49	Inverse Trigonometric & Inverse Hyperbolic Functions Contour Integrals; Fundamental Theorem of Calculus
February 27 March 1	13 14	50-53 54-56	The Cauchy-Goursat Theorem The Cauchy Integral Formula
March 5 March 8	15 16	 57-59	***MIDTERM*** The Extensions of the Cauchy Integral Formula
March 11-15	Spring Break		
March 19 March 22	17 18	60-65 66-68	Taylor Series; Power Series Convergence Laurent Series
March 26	19	69-71	Uniform Convergence; Integration & Differentiation of Power Series
March 29			NO CLASS (Good Friday holiday)
April 2 April 5	20 21	72-73 74-80	Series Multiplication and Division Cauchy's Residue Theorem, Zeros and Singularities
April 9 April 12	23 24	81-84 85-87	The Point at Infinity Improper Integrals from Fourier Analysis
April 16 April 19	25 26	88 89-90	Improper Integrals Continued: Jordan's Lemma Integrals Involving Indented Contours
April 23 April 26	27 28	91 92	Integration along a Branch Cut Definite Integrals Involving Sines and Cosines
May 2	29	***REVIEW FOR FINAL EXAM***	

Updated by Professor T. Askham *- 01/04/2023*
Department of Mathematical Sciences Course Syllabus, Spring 2024