

MATH 332-002: Introduction to Functions of a Complex Variable

Spring 2021 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

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 Enkeleida Lushi

Class time: Tuesdays and Fridays 2:30-3:50pm, Synchronous Online

Office Hours for All Math Instructors: [Spring 2021 Office Hours and Emails](#)

Required Textbook:

Title	<i>Complex Variables and Applications</i>
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 5, 2021**. 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, in particular its use in calculating certain definite integrals. Learn how to apply the knowledge of analytic functions to problems in applied mathematics, science and engineering.

Course Outcomes

- Students gain deeper knowledge of the theory of analytic functions of a complex variable, and its broad applicability.
- Students gain 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, electrostatics, and other areas of science and engineering.

Course Assessment: The assessment of objectives is achieved through homework assignments and quizzes, and the in-class 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 and Quizzes	30%
Midterm Exam	30%
Final Exam	40%

Your final letter grade will be based on the following tentative curve.

A	87 - 100	C	62 - 67
B+	81 - 86	D	55 - 61
B	75 - 80	F	0 - 54
C+	68 - 74		

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. A short quiz based on the homework problems will be given every other week, and will be announced at least one day in advance.

Exams: There will be one midterm exam and one comprehensive final exam. Both will be held virtually. Exams are held on the following days:

Midterm Exam	March 12, 2021
Final Exam Period	May 7 - 13, 2021

The final exam will test your knowledge of all the course material taught in the entire course. Make sure you read and fully understand the [Math Department's Examination Policy](#). This policy will be strictly enforced.

Makeup Exam Policy: There will be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event 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 2021 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](#).

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

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 contact Chantonette Lyles, Associate Director of the Office of Accessibility Resources and Services at [973-596-5417](tel:973-596-5417) or via email at lyles@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibility Resources and Services 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/studentssuccess/accessibility/>

Important Dates (See: [Spring 2021 Academic Calendar](#), Registrar)

Date	Day	Event
January 19, 2021	T	First Day of Classes
January 23, 2021	S	Saturday Classes Begin
January 25, 2021	M	Last Day to Add/Drop Classes
March 14 - March 21, 2021	Su - Su	Spring Recess - No Classes
April, 2, 2021	F	Good Friday - No Classes
April 5, 2021	M	Last Day to Withdraw
May 4, 2021	T	Friday Classes Meet
May 4, 2021	T	Last Day of Classes
May 5 & May 6, 2021	W & R	Reading Days
May 7 - May 13, 2021	F - R	Final Exam Period

Course Outline

Date	Lecture	Sections	Topic
January 19 January 22	1 2	1-5 6-11	Complex Algebra; Vectors & Moduli; Complex Conjugate Polar Representation; Products & Powers in Exponential Form; Roots
January 26 January 29	3 4	12 13-14	Regions in the Complex Plane Functions of Complex Variable; Mappings
February 2 February 5	5 6	15-18 19-23	Limits and Continuity Derivatives & Analyticity; The Cauchy-Riemann Equations
February 9 February 12	7 8	24-26 27-29	Analyticity; Cauchy-Riemann Equations in Polar Coordinates Harmonic Functions; Uniquely Determined Functions; Reflection Principle
February 16 February 19	9 10	30-36 37-39	The Exponential and Logarithm, The Power Function Trigonometric and Hyperbolic Functions
February 23 February 26	11 12	40 41-49	Inverse Trigonometric & Inverse Hyperbolic Functions Contour Integrals; Fundamental Theorem of Calculus
March 2 March 5	13 14	50-54 55-59	The Cauchy-Goursat Theorem & The Cauchy Integral Formula The Extensions of the Cauchy Integral Formula
March 9 March 12	15 16	<i>Review for the Midterm Exam</i> MIDTERM EXAM	
Mar 14-21	Spring Break		
March 23 March 26	17 18	55-59 60-65	The Extensions of the Cauchy Integral Formula Taylor Series; Power Series Convergence
March 30 April 2	19 20	66-68 69-72	Laurent Series Uniform Convergence; Integration & Differentiation of Power Series
April 6 April 9	21 22	73 74-76	Series Multiplication, Division, Composition Cauchy's Residue Theorem
April 13 April 16	23 24	77-84 85-87	Zeros and Singularities; The Point at Infinity Improper Integrals from Fourier Analysis
April 20 April 23	25 26	88 89-90	Improper Integrals Continued: Jordan's Lemma Integrals Involving Indented Contours
April 27 April 30	27 28	91 92	Integration along a Branch Cut Definite Integrals Involving Sines and Cosines
May 4	29	REVIEW FOR FINAL EXAM	

Updated by Professor E. Lushi - 1/5/2020
Department of Mathematical Sciences Course Syllabus, Spring 2021