MATH 332: Introduction to Functions of a Complex Variable
Fall 2022 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 322-001	Professor P.G. Petropoulos

Class time: TBA

Office Hours for All Math Instructors: Fall 2022 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 **M** is **Monday, November 14, 2022**. 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 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 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	40%
Midterm Exam	30%
Final Exam	30%

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

A	88 - 100	**C**	66 - 71
B+	83 - 87	**D**	60 - 65
B	77 - 82	**F**	0 - 59
C+	72 - 76		

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: 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. Exams will be tentatively held on the following days:

Midterm Exam	October 25, 2022
Final Exam Period	December 16 – 22, 2022

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: Fall 2022 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 Scott Janz, Associate Director of Disability Support Services at 973-596-5417 or via email at scott.p.janz@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.

Important Dates (See: Fall 2022 Academic Calendar, Registrar)

Date	Day	Event
September 5, 2022	Monday	Labor Day
September 6, 2022	Tuesday	First Day of Classes
September 12, 2022	Monday	Last Day to Add/Drop Classes
November 14, 2022	Monday	Last Day to Withdraw
November 22, 2022	Tuesday	Thursday Classes Meet
November 23, 2022	Wednesday	Friday Classes Meet
November 24 to November 25, 2022	Thursday and Friday	Thanksgiving Recess - Closed
November 26, 2022	Saturday	Saturday Classes Meet
December 14, 2022	Wednesday	Last Day of Classes
December 15, 2022	Thursday	Reading Day
December 16 to December 22, 2022	Friday to Thursday	Final Exam Period

Course Outline

Sections	Topic
1-5	Complex Algebra; Vectors & Moduli; Complex Conjugate
6-11 12	Polar Representation; Products & Powers in Exponential Form; Roots Regions in the Complex Plane
13-14 15-18	Functions of Complex Variable; Mappings Limits and Continuity
19-23 24-26	Derivatives & Analyticity; The Cauchy-Riemann Equations Analyticity; Cauchy-Riemann Equations in Polar Coordinates
27-29 30-36	Harmonic Functions; Uniquely Determined Functions; Reflection Principle The Exponential and Logarithm, The Power Function
37-39 40	Trigonometric and Hyperbolic Functions Inverse Trigonometric & Inverse Hyperbolic Functions
41-49 50-54	Contour Integrals; Fundamental Theorem of Calculus The Cauchy-Goursat Theorem & The Cauchy Integral Formula
55-59	The Extensions of the Cauchy Integral Formula *Review for the Midterm Exam*
60-65	**MIDTERM October 25, 2022** Taylor Series; Power Series Convergence
66-68 69-72	Laurent Series Uniform Convergence; Integration & Differentiation of Power Series
73 74-76	Series Multiplication, Division, Composition Cauchy's Residue Theorem

77-84 85-87	Zeros and Singularities; The Point at Infinity Improper Integrals from Fourier Analysis
88	Improper Integrals Continued: Jordan's Lemma
89-90 91	Integrals Involving Indented Contours Integration along a Branch Cut
92	Definite Integrals Involving Sines and Cosines ***REVIEW FOR FINAL EXAM***

Updated by Professor P.G. Petropoulos - 8/30/2022
Department of Mathematical Sciences Course Syllabus, Fall 2022