Fall 2019

MATH 332-001: Introduction to Functions of a Complex Variable

P. Petropoulos

NJIT New Jersey's Science & Technology University

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF MATHEMATICAL SCIENCES

MATH 332-001: Introduction to Functions of a Complex Variable
Fall 2019 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 332-001	Professor P. Petropoulos

Office Hours for All Math Instructors: Fall 2019 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, November 11, 2019**. It will be strictly enforced.

COURSE GOALS

Course Objectives:

- Gain deep understanding of the relevance and broad importance of the theory of analytic functions.
- Learn the meaning of theorems describing important properties of analytic functions, and understand their

corollaries.
- Learn the deep 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, 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	28%
Attendance	2%
Midterm Exam	34%
Final Exam	36%

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 emailed at the end of each week, and will be based on the material covered that week. Late homework will not be accepted. A short quiz based on the homework problems will be given about every other week, and will be announced at least one day in advance.

Exams: There will be one midterm exam held in class during the semester and one comprehensive final exam. Exams are held on the following days:

Midterm Exam	October 15, 2019
Final Exam Period	December 15 - 21, 2019

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 Cullimore, Room 214 (See: Fall 2019 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: Disability Support Services (DSS) 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 Disability Support Services at 973-596-5417 or via email at lyles@njit.edu. The office is located in Fenster Hall Room 260. A Letter of Accommodation Eligibility from the Disability Support 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 Disability Support Services (DSS) website at:

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

Important Dates (See: Fall 2019 Academic Calendar, Registrar)

Date	Day	Event
September 3, 2019	T	First Day of Classes
September 13, 2019	F	Last Day to Add/Drop Classes
November 11, 2019	M	Last Day to Withdraw
November 26, 2019	T	Thursday Classes Meet
November 27, 2019	W	Friday Classes Meet
November 28-29, 2019	R-F	Thanksgiving Recess
December 11, 2019	W	Last Day of Classes
December 12, 13 2019	R & F	Reading Days
December 14-20, 2019	F – R	Final Exam Period

Course Outline

Lecture	Sections	Topic
1	1-.5	Complex Algebra; Vectors & Moduli; Complex Conjugate
2	6-11	Polar Representation; Products & Powers in Exponential Form; Roots
3	12	Regions in the Complex Plane
4	13-14	Functions of Complex Variable; Mappings
5	15-18	Limits and Continuity
6	19-23	Derivatives & Analyticity; The Cauchy-Riemann Equations
7	24-26	Analyticity; Cauchy-Riemann Equations in Polar Coordinates
8	27-29	Harmonic Functions; Uniquely Determined Functions; Reflection Principle
9	30-36	The Exponential and Logarithm, The Power Function
10	37-39	Trigonometric and Hyperbolic Functions
11	40	Inverse Trigonometric & Inverse Hyperbolic Functions
12	**REVIEW FOR THE MIDTERM EXAM**	
13	**MIDTERM EXAM - OCTOBER 15, 2019**	
14	41-49	Contour Integrals; Fundamental Theorem of Calculus
15	50-54	The Cauchy-Goursat Theorem & The Cauchy Integral Formula
16	55-59	The Extensions of the Cauchy Integral Formula
17	60-65	Taylor Series; Power Series Convergence
18	66-68	Laurent Series
19	69-72	Uniform Convergence; Integration & Differentiation of Power Series
20	73	Series Multiplication, Division, Composition
21	74-76	Cauchy's Residue Theorem
22	77-84	Zeros and Singularities; The Point at Infinity
23	85-87	Improper Integrals from Fourier Analysis
24	88	Improper Integrals Continued: Jordan's Lemma
25	89-90	Integrals Involving Indented Contours
26	91	Integration along a Branch Cut
27	92	Definite Integrals Involving Sines and Cosines
28	**REVIEW FOR FINAL EXAM**	