Spring 2016 Course Syllabus: Math 656 – 002

Course Title:	**Complex Variables I**
Textbook:	**Complex Variables**, M. Ablowitz & A. Fokas + Notes
Prerequisites:	Math 545 or Math 645
Website:	http://web.njit.edu/~matveev/M656_S16/

Course Objectives

- Gain deep understanding of the relevance and broad mathematical importance of the theory of analytic functions.
- Learn key theorems describing important properties of analytic functions, and understand their meaning and their corollaries.
- Learn the deep connection between the series representation and contour integral 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 and natural sciences

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 both elementary and special transcendental functions through the knowledge of their properties in the complex plane.
- Students are prepared for further study in more advanced applied mathematics courses.
- Students are prepared for the Complex Analysis part of the Ph.D. Qualifying Examination at NJIT
- Students can apply the theory of analytic functions to solve problems in applied mathematics, fluid dynamics and electrodynamics.

Course Assessment

- The assessment of objectives is achieved through homework assignments, and the in-class midterm and final examinations.

COURSE OUTLINE		
Lect.	**Sectio ns**	**Topic**
1/20	1.1	Complex Numbers and Their Properties
1/25	1.2	Elementary Functions and Stereographic Projection
1/27	1.3, 1.4	Limits, Continuity, Analyticity
2/1	1.4, 2.1	Analytic Functions
2/3	2.1	Analytic Functions
2/8	2.1, 2.2	Multivalued Functions
2/10	2.3	Multivalued Functions and Riemann Surfaces
2/15	2.4	Complex Integration
2/17	2.4, 2.5	Complex Integration and Cauchy's Theorem
2/22	2.5, 2.6	Cauchy's Theorem and Cauchy's Integral Formula
2/24	2.6	Extended Cauchy's Integral Formula
2/29	2.6	Liouville, Morera and Maximum Modulus Theorems
3/2	3.1	Complex Series and Basic Properties
3/7	**Review for Midterm Exam**	
3/9	**MIDTERM EXAM: March 9, 2016**	
3/14-19	**Spring Recess**	
3/21	3.2	Taylor Series

3/23	3.3	Laurent Series
3/28	3.4	Theoretical Results for Series
3/30	3.5	Singularities, Analytic Continuation, and Natural Boundaries
4/4	3.6	Infinite Products and Mittag-Leffler Expansions
4/6	4.1	Cauchy Residue Theorem
4/11	4.2	Applications: Evaluation of Improper Definite Integrals
4/13	4.2	Applications: Evaluation of Certain Definite Integrals
4/18	4.3	Applications: Integrals with Branch Points
4/20	4.3	Applications: Integrals with Branch Points
4/25	4.4	The Argument Principle and Rouche's Theorem
4/27	4.4	The Argument Principle and Rouche's Theorem
5/2	**Review for FINAL EXAM**	

IMPORTANT DATES	
FIRST DAY OF SEMESTER	January 19, 2016
MIDTERM EXAM	March 9, 2016
LAST DAY TO WITHDRAW	March 28, 2016
LAST DAY OF CLASSES	May 3, 2016 (Friday Schedule)
FINAL EXAM PERIOD	May 6-12, 2016

Grading Policy

Assignment Weighting	
Homework	24 %
Midterm Exam	34 %
Final Exam	42 %
TOTAL	100%

Tentative Grading Scale	
A	86 -- 100
B+	80 -- 85
B	74 – 79
C+	67 – 73
C	60 – 66
F	0 – 59

Course Policies

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.

Prepared by Prof. Victor Matveev, December 23, 2015