Jordan University of Science and Technology

Faculty of Science & Arts

Mathematics Department

MATH308 Complex Analysis

Second Semester 2022-2023

Course Catalog
3 Credit Hours. This course will introduce and investigate the concept of complex numbers and complex functions. First, we present the properties of complex numbers and then learn the concept of limits, continuity, and differentiation for complex functions. Then we shall carefully understand the meaning of " Analytic functions" Finally, we shall discuss the integration of complex functions and the techniques to evaluate improper integration in the complex field.

Text Book	
Title	Complex Variables with Applications
Author(s)	J. Brown and R. Churchill
Edition	7th Edition
Short Name	TextBook
Other Information	

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref 1	Fundamentals of Complex Analysis	E. B. Saff and A. D. Snider	3rd Edition	

Instructor	
Name	**Dr. Mohammad Al Dolat**
Office Location	PH2 LEVEL 0
Office Hours	Sun : 09:30 - 10:30 Sun : 13:30 - 14:30 Mon : 08:30 - 09:15 Mon : 14:30 - 15:30 Tue : 11:30 - 12:30 Wed : 14:30 - 15:30 Thu : 15:30 - 16:30
Email	mmaldolat@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Mon, Wed : 13:00 - 14:30 Room: NG56

Prerequisites		
Line Number	**Course Name**	**Prerequisite Type**
902010	MATH201 Intermediate Analysis	Prerequisite / Pass
902450	MATH245 Set Theory And Logic	Prerequisite / Pass

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Week 1	Complex numbers: Sums and products, Algebraic properties, Moduli and conjugates, Triangle inequalities	**Sections: 1, 2, 3, 4** From **TextBook**
Week 2	Polar coordinates and Euler's formula. Product and quotient in exponential form. Roots of complex numbers. Region in complex plane.	**Sections: 5, 6, 7, 8** From **TextBook**
Week 3	Functions of complex variables. Mappings. Limits. Theorems of limits.	**Sections: 9, 10, 11, 12** From **TextBook**
Week 4	Limits involving the point at infinity. Continuity. Derivative. Differentiation formulas.	**Sections: 13, 14, 15, 16** From **TextBook**
Week 5	Cauchy-Riemann equations. Sufficient condition for Differentiability. Polar coordinates.	**Sections: 17, 18, 19** From **TextBook**
Week 6	Analytic functions. Reflection Principle. Harmonic functions	**Sections: 20, 21, 22** From **TextBook**
Week 7	Exponential functions. Trigonometric functions. Hyperbolic functions. The logarithmic function and its branches	**Sections: 23, 24, 25, 26** From **TextBook**
Weeks 8, 9	Some identities involving logarithms. Complex exponent. Inverse trigonometric and hyperbolic functions.	**Sections: 27, 28, 29** From **TextBook**
Week 10	Complex valued functions w(t). Contours. Contour integrals and examples	**Sections: 30, 31, 32** From **TextBook**
Week 11	Antiderivatives. Cauchy-Goursat theorem. Simply and multiply connected domains	**Sections: 34, 35, 36, 38** From **TextBook**
Week 12	Cauchy integral formulas, Derivative of analytic functions. Liouville's theorem and fundamental theorem of algebra. Maximum moduli functions.	**Sections: 39, 40, 41, 42** From **TextBook**
Week 13	Convergence of sequence and series. Taylor series and examples. Laurent series.	**Sections: 43, 44, 45, 46** From **TextBook**
Week 14	Residues. Residues theorem. The three types of isolated singular points.	**Sections: 53, 54, 55** From **TextBook**

Week 15	Residues at poles. Zeros and poles of order m. Some applications	**Sections: 56, 57** From **TextBook**

Mapping of Course Outcomes to Program Student Outcomes	**Course Outcome Weight (Out of 100%)**	**Assessment method**
Ability to compute Sums, products, Moduli, and conjugates of complex numbers. [1SLO1]	20%	
To know Functions of complex variables, determine the differentiability of complex functions, and use Cauchy-Riemann equations to test the differentiability. [1SLO1]	30%	
To understand the concept of Harmonic functions. [1SLO1]	20%	
The Ability to use Residues theorem to compute some integrals. [1SLO1]	30%	

Relationship to Program Student Outcomes (Out of 100%)					
SLO1	SLO2	SLO3	SLO4	SLO5	SLO6
100					

Evaluation	
Assessment Tool	**Weight**
first exam	30%
second exam	30%
final exam	40%

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