

COURSE DESCRIPTIONS

Faculty	Science and Information Technology				
Department	Mathematics	NQF level	5		
Course Title	Complex Analysis I	Code	505308	Prerequisite	505202
Credit Hours	3	Theory	3	Practical	0
Course Leader	Dr: Belal Batiha	email	b.bateha@jadara.edu.jo		
Lecturers	Dr: Belal Batiha	emails	b.bateha@jadara.edu.jo		
Lecture time	08:30-10:00 Sun, Tus	Classroom	D307	Attendance	Fulltime
Semester	First Semester 2022\2023	Production	2008	Updated	2022

Short Description

The objective of this course is to introduce the fundamental ideas of the functions of complex variables and developing a clear understanding of the fundamental concepts of Complex Analysis such as analytic functions, complex integrals and a range of skills which will allow students to work effectively with the concepts.

Course Objectives

Algebraic of properties complex numbers, Exponential, Logarithmic and trigonometric functions, and their inverses, Analytic functions: Cauchy – Riemann equations, polar coordinates and Harmonic functions, Integrals: Cauchy–Goursat theorem and Cauchy integral formula. Intended Learning

Learning Outcomes

A. Knowledge - Theoretical Understanding

- a1) Understand fundamentals and basic properties of the complex number.
- a2) Compare the fundamentals and basic properties between the real Numbers and Complex Numbers.

B. Knowledge - Practical Application

- a3) Discuss the fundamental concepts of complex analysis and their role in modern mathematics.

C. Skills - Generic Problem Solving and Analytical Skills

- b1) Generalize theorems and lemmas from real Analysis to complex.

D. Skills - Communication, ICT, and Numeracy

b2) Apply Cauchy Riemann Equation and Cauchy Coursat Theorem.
E. Competence: Autonomy, Responsibility, and Context
Teaching and Learning Methods
Lectures, discussions, and solving selected problems.
Assessment Methods
<ul style="list-style-type: none"> • Discussion and Interaction • Mid Term Exam, Final exam, Class Assignment Quizzes,

Course Contents					
Week	Hours	CLOs	Topics	Teaching & Learning Methods	Assessment Methods
1.	3	a1, a3, b2.	Complex numbers: sums and products, Algebraic properties, Moduli and conjugates.	Lecturing, examples, Discussion	Quizzes Assignments
2.	3	a1, b1, b2	Triangle Inequality, Polar coordinates and Euler's formula.	Lecturing, examples, Discussion	Quizzes Assignments
3.	3	a1, a2. a3, b2,	Root in complex plane, Regions in the complex plane.	Lecturing, examples, Discussion	Quizzes Assignments
4.	3	a1, b2. a3	Analytic functions: Functions of complex variable, limits, Theorem on limits.	Lecturing, examples, Discussion	Quizzes Assignments
5.	3	a1, b1,	Continuity, Derivatives, Differentiation formulas.	Lecturing, examples, Discussion	Assignments
6.	3	a1, b2,	Cauchy-Riemann Equations, sufficient conditions for Differentiability.	Lecturing, examples, Discussion	Assignments
7.	3	a1, b2. a3	Polar coordinates analytics functions, Harmonic functions.	Lecturing, examples, Discussion	Assignments
8.	3	a1, b2. a3	Elementary Functions: The exponential function, Trigonometric Function, Hyperbolic Function.	Lecturing, examples, Discussion	Med Exam

9.	3	a2, a3	The logarithmic function and its Branches, some identities involving logarithms, complex exponent.	Lecturing, examples, Discussion	Assignments
10.	3	a2, a3	Integrals: complex-valued functions, contours, contours integrals.	Lecturing, examples, Discussion	Assignments
11.	3	a1, b2. a3	Examples, Antiderivatives.	Lecturing, examples, Discussion	Quizzes Assignments
12.	3	a1, b2. a3	Cauchy-Goursat Theorem, simply and multiply connected domains	Lecturing, examples, Discussion	Quizzes Assignments
13.	3	a1	Cauchy integral formula, Derivative of analytic functions	Lecturing, examples, Discussion	Quizzes Assignments
14.	3	a1	Morera's theorem Liouville's theorem	Lecturing, examples, Discussion	Quizzes Assignments
15.	3	a1, a3	Fundamental theorem of algebra, maximum moduli of function	Lecturing, examples, Discussion	Quizzes Assignments
16.	Final Exam				

Infrastructure	
Textbook	Complex Variables and Applications, By James Ward Brown, Ruel V. Churchill
References	1- J.Paliouras & D.S. Meadows, "Complex variables for scientists and Engineers" .2nd Edition 2-Marsden, J.E.& M.J. Hoffmann "Basic complex Analysis." 3-Alfors, L.V, "Complex Analysis".
Required reading	
Electronic materials	
Other	

Course Assessment Plan						
Assessment Method	Grade	CLOs				
		a1	a2	a3	b1	b2
First (Midterm)	30	10	4	4	5	7
Second (if applicable)	0					
Final Exam	50	12	8	18	7	5
Coursework						
Coursework assessment methods	Assignments	10	5		5	
	Case study					
	Discussion and interaction					
	Group work activities					
	Lab tests and assignments					
	Presentations					
	Quizzes	10	5		5	
Total	100	32	12	32	12	12

Plagiarism
<p>Plagiarism is claiming that someone else's work is your own. The department has a strict policy regarding plagiarism and, if plagiarism is indeed discovered, this policy will be applied. Note that punishments apply also to anyone assisting another to commit plagiarism (for example by knowingly allowing someone to copy your code).</p> <p>Plagiarism is different from group work in which a number of individuals share ideas on how to carry out the coursework. You are strongly encouraged to work in small groups, and you will certainly not be penalized for doing so. This means that you may work together on the program. What is important is that you have a full understanding of all aspects of the completed program. In order to allow proper assessment that this is indeed the case, you must adhere strictly to the course work requirements as outlined above and detailed in the coursework problem description. These requirements are in place to encourage individual understanding, facilitate individual assessment, and deter plagiarism.</p>

رئيس قسم الرياضيات

د. عرين الخطيب



منسق المادة

د. بلال بطيحة

