جامعة الزيتونة الأردنية

Al-Zaytoonah University of Jordan

Course Syllabus

According to JORDAN National Qualification Framework (JNQF)

Course Name: Complex Analysis

Course Number: 0101351

General Course Information:

Course Title	Complex Analysis
Course Number	0101351
Credit Hours	3 credit hours
Education Type	Blended learning
Prerequisites/Co-requisites	Real Analysis 1
Academic Program	Mathematics
Program Code	
Faculty	Faculty of Science and Information Technology
Department	Mathematics
Level of Course	3
Academic Year /Semester	2023/2024 1st Semester
Awarded Qualification	BS'c
Other Department(s) Involved in Teaching the Course	-
Language of Instruction	English
Date of Production	2021-2022
Date of Revision	October 2023

Course Coordinator:

Coordinator's Name	Iqbal H. Jebril
Office No.	117
Office Phone Extension Number	
Office Hours	9:00-10:30
E-mail	i.jebril@zuj.edu.jo

Other Instructors:

Instructor Name	
Office No.	
Office Phone Extension Number	
Office Hours	
Email	

Course Description *(English/Arabic)*:

English	This course introduce an advanced concepts of analysis it concerns on: Complex numbers, Algebraic properties, Cartesian coordinates, The triangle Inequality, Polar coordinates, Power and roots, Functions of a complex variable, Limits, Continuity, Derivatives, The Cauchy-Riemann equations, Analytic functions, Harmonic functions, The exponential functions, Trigonometric functions, Branches of Logz, Complex exponent, Contours, Line integrals, The Cauchy-Goursat theorem, Cauchy integral formula, Derivative of analytic functions.
Arabic	هذا المساق يقدم مفاهيم متقدمة في التحليل فهو يركز على: الأعداد المركبة، الخواص الجبرية، الإحداثيات الديكارتية، متباينة المثلث، الإحداثيات القطبية، القوى والجذور، دوال المتغير المركب، النهايات، الاستمرارية، المشتقات، معادلات

	كوشي–ريمان، الدوال التحليلية، الدوال التوافقية، الدوال الأسية، الدوال المثلثية ، فروع لوجز ، الأسس المركبة، الخطوط الكنتورية، تكاملات الخط، نظرية كوشي–جورسات، صيغة كوشي التكاملية، مشتقات الدوال التحليلية.

Textbook: *Author(s), Title, Publisher, Edition, Year, Book website.*

Complex analysis, third edition by Dennis G. Zill & Patrick D. Shnahan. Jones & Bartlett Learning, 2015.

References: *Author(s), Title, Publisher, Edition, Year, Book website.*

1. Complex analysis, third edition by Dennis G. Zill & Patrick D. Shnahan. Jones & Bartlett Learning, 2015.
2. Complex Variables and Applications". By: R. Churchil and J. Brown McGraw-Hill, 7th Edition (2003).

Course Educational Objectives (CEOs):

CEO1	Develop a strong foundation in complex numbers, including operations, representations, and properties of complex arithmetic.
CEO2	Gain a deep understanding of analytic functions and the concept of holomorphicity, including the Cauchy-Riemann equations.
CEO3	Learn techniques for evaluating complex line integrals and contour integrals, and understand the relationship between real and complex line integrals.

Intended Learning Outcomes (ILO's):

Intended learning outcomes (ILOs)		**Relationship to CEOs**	**Contribution to PLOs**	**Bloom Taxonomy Levels***	**JNQF Descriptors****
K	Knowledge and Understanding				
ILO1-k	Analyticity and differentiation of the complex function.	CEO 3	PLO2-k	Analyzing	K
ILO2-k	Calculating the integral of complex functions.	CEO 3	PLO4-k	Applying	K
S	Intellectual skills				
ILO3-s	Graphing complex functions on paper, calculator and computer.	CEO 3	PLO5-s	Applying	S
C	Subject specific skills				
ILO4-c	Using complex analysis to solve various problems in all branches of mathematics.	CEO 3	PLO11-c	Evaluating	C
D	Transferable skills:				
ILO5-d					

***Bloom Taxonomy Levels:**

Level #	1	2	3	4	5	6
Level Name	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating

**** Descriptor (National Qualification Framework Descriptors): K: Knowledge, S: Skill, C: Competency.**

Program Learning Outcome (PLOs):

	(PLOs)	JNQF Descriptors**		
		K	S	C
1.	Knowledge of the main concepts in pure mathematics.	√		
2.	Knowledge of the main concepts in applied mathematics.	√		
3.	Explain concepts, principles and theories in the fields of probability and statistics.	√		
4.	Possession of technological culture related to the fields of mathematics and its applications.	√		
5.	Making use of mathematical logic in practical life.	√		
6.	Engaging scientific methodology as a way of thinking and as a tool in facing problems.		√	
7.	Applying mathematical software packages in problem solving.		√	
8.	Being capable of data analysis.		√	
9.	Capability of teaching according to modern educational techniques.		√	
10.	Develop creative and innovative methods of teaching mathematics.			√
11.	Showing the ability to work under ethical and professional standards within teams.			√
12.	Gaining critical thinking and scientific research skills.			√

**** Descriptors according to the national qualifications framework (K: knowledge, S: skill, C: Competency)**

Weekly Schedule *(please choose the type of teaching)*

- ☐ Face to Face (F2F)
- ☒ **Hybrid** *(One – To - One)*
- ☐ Online

Schedule of Simultaneous and their Topics:

Week	First Lecture (F2F)	Second Lecture	ILOs	PLOs	JNQF Descriptors*
1	Complex Numbers, Sums and Products	Activity: (Video) about Further Properties and Moduli	ILO1-k	PLO1-k	K
2	Complex Conjugates	Activity: (Homework) about Exponential Form	ILO1-k ILO3-s	PLO2-k	K,S
3	Products and Quotients in Exponential Form	Video about the Roots of Complex Numbers Regions in the Complex Plane	ILO1-k ILO2-k	PLO4-k	K
4	Functions of a Complex Variable	Video and Quiz about Mappings	ILO3-s	PLO7-s	S

5	Theorems on Limits	Homework about Limits Involving the Point at Infinity Continuity	ILO1-k	PLO3-k	K
6	Derivatives	Video and Quiz about Differentiation Formulas	ILO3-s	PLO6-s	S
7	Cauchy-Riemann Equations Sufficient Conditions for Differentiability	Quiz and Revision	ILO4-c	PLO11-c	C
Midterm Exam (30%)					
9	Cauchy Riemann Equations in Polar System	Video about Analytic Functions	ILO1-k ILO2-k	PLO5-k	K
10	Harmonic Functions	Homework about the Exponential Function	ILO4-c	PLO11-c	C
11	Logarithmic Function	Video and Quiz about Complex Exponents	ILO2-k	PLO2-k	K
12	Derivatives of Logarithms	Homework about Some Identities Involving Logarithms	ILO3-s	PLO8-s	S
13	Trigonometric Functions, Hyperbolic Functions	Video about the Inverse Trigonometric and Hyperbolic Functions, Complex-Valued Functions w(t)	ILO3-s	PLO9-s	S
14	Contours, Contour Integrals	Video and Homework about Antiderivatives, Cauchy-Goursat Theorem Simply and Multiply Connected Domains	ILO3-s	PLO7-s	S
15	**Projects Discussion**				
16	**Final Exam**				

* K: Knowledge, S: Skills, C: Competency

Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- Lecture.
- Learning through problem solving.

Course Policies:

A- Attendance policies:
The maximum allowed absences is 15% of the lectures.
B- Absences from exams and handing in assignments on time:
Midterm exam can be retaken based on approval of excuse by the instructor's discretion.
Not handing assignment on time will incur penalties.
C- Academic Health and safety procedures
D- Honesty policy regarding cheating, plagiarism, and misbehaviour:
Cheating, plagiarism, misbehaviour will result in zero grade and further disciplinary actions may be taken.
E- Grading policy:

- All homework is to be posted online through the e-learning system.
- Exams will be marked within 72 hours and the marked exam papers will be handed to the students.
- Online Activities (Course Videos, Homework, Quizzes) **20%**
- Midterm 30**%**
- Final Exam 50**%**

F- Available university services that support achievement in the course: **E-Learning Platform, Labs, Library.**

Required Equipment:

- PC / Laptop with webcam and mic
- Internet Connection
- Access to the ZUJ E-Learning Platform at https://exams.zuj.edu.jo/
- E-learning plan

Assessment Tools Implemented in the Course:

- Final Exam
- Midterm Exam
- Quizzes
- Homework
- Periodic reports for learning assessment

Responsible Persons and their Signatures:

Course Coordinator	**Iqbal Batiha**	**Completed Date**	**Oct** / 2023
		Signature	
Received by (Department Head)		**Received Date**	/ /

Signature	