



Course Specifications

Course Title:	Complex analysis
Course Code:	23044453-4
Program:	Bachelor of Mathematics
Department:	Mathematics Department
College:	Jamoum University College
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 4 credit hours
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: 8 th level
4. Pre-requisites for this course (if any): Real Analysis (1)
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	60
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	60
Other Learning Hours*		
1	Study	70
2	Assignments	15
3	Library	0
4	Projects/Research Essays/Theses	0
5	Others (specify)	0
	Total	85

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description
2. Course Main Objective By the end of the course the students will learn the following main concepts: a) Analytic functions. b) Elementary functions with complex variable. c) Definite integral on functions

with complex variable and contour integrals. d) Convergence of complex sequence and series.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	Recognize basic knowledge of complex numbers and polar coordinates Define the related basic scientific facts, concepts, principles and techniques calculus	
1.2	Recognize the relevant theories and their applications in basic mathematics.	
1.3		
1.4		
2	Skills :	
2.1	Develop connections of complex analysis with other disciplines	
2.2	Solve problems using a range of formats and approaches in basic science	
2.3	show the ability to work independently and within groups.	
2.4		
2.5		
3	Competence:	
3.1	Introduce elementary function and operation on these functions, and the notion of brunch cut Define integral and contours on the complex plan Compute the series and Laurent series of complex function and the residue of a function	
3.2	Compute limits of complex functions and their derivatives Knowledge if a function is analytic or not	

C. Course Content

No	List of Topics	Contact Hours
1	Analytic functions, Complex numbers and functions, Complex limits and differentiability, Elementary examples, Analytic functions	12
2	Elementary Functions The Exponential Function The Logarithmic Function Branches and Derivatives of Logarithms Some Identities Involving Logarithms Complex Exponents Trigonometric Functions Hyperbolic Functions Inverse Trigonometric and Hyperbolic Functions	10
3	Integrals, Definite Integrals of Functions, Contours and Contour Integrals Some Examples: examples with Branch Cuts, Antiderivatives Cauchy–Goursat Theorem, Simply Connected Domains, Multiply Connected Domains, Cauchy Integral Formula, Liouville’s Theorem and the Fundamental Theorem of Algebra, Maximum Modulus Principle	20
4	Series, Convergence of Sequences, Convergence of Series, Taylor Series Laurent Series, Isolated singularities and their classification, Residue Theorem: Calculation of definite integrals and evaluation of infinite series using residues	18

Total	60
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D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge		
1.1	Recognize basic knowledge of complex numbers and polar coordinates Define the related basic scientific facts, concepts, principles and techniques calculus	Lectures, Tutorials and exams	Written Exams
1.2	2 Recognize the relevant theories and their applications in basic mathematics.		
1.3			
2.0	Skills		
2.1	Introduce elementary function and operation on these functions, and the notion of branch cut Define integral and contours on the complex plane Compute the series and Laurent series of complex function and the residue of a function	Lectures Tutorials and	Written Exams
2.2	Compute limits of complex functions and their derivatives Knowledge if a function is analytic or not		
2.3			
3.0	Competence		
3.1	Develop connections of complex analysis with other disciplines	Working together Brainstorming: A Method of solving problems in which all members of a group suggest ideas and then discuss them.	Group study to do homework
3.2	Solve problems using a range of formats and approaches in basic science		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Test (1)	6 th week	20%
2	Midterm Test (2)	12 th week	20%
3	Homework + Reports + Quizzes	During the semester	10%
4	Final Examination	End of semester	50%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Each group of students is assigned to a particular faculty where he or she will provide academic advising during specific academic hours. Each staff will provide at least one session/week.
- There will be an academic advisor how will be a responsible for helping the student by doing the general supervision.
- The people in the library will support the students during the time of the course.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	COMPLEX VARIABLES AND IT APPLICATIONS (Eighth Edition) BY James Ward Brown and Ruel V. Churchill
Essential References Materials	a) An Introduction to Complex Analysis by Ravi P. Agarwal • Kanishka Perera, Sandra Pinelas. b) Functions of one complex variable by John. B. Conway
Electronic Materials	https://en.wikipedia.org/wiki/Category:Complex_analysis
Other Learning Materials	Microsoft Excel

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	-The size of the room should be proportional to the number of students - Provide enough seats for students. - The number of student not exceed on 30 in the classroom - Library

Item	Resources
Technology Resources (AV, data show, Smart Board, software, etc.)	-Hall is equipped with a computer. - Provide overhead projectors and related items -Smart board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	none

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student feedback through electronic facilities organized by the deanship of egistration and acceptance. • Following completion of the prescribed course study in Pediatrics module, an evaluation should be conducted through the following: A student questionnaire feedback should be carried out on the	Faculty	Direct
Evaluation of the teachers by internal & external faculty members. • Visiting to the classrooms. • Mutual visits between colleagues and giving advices to each other after each lecture • A staff questionnaire feedback about course	Faculty	Direct

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	