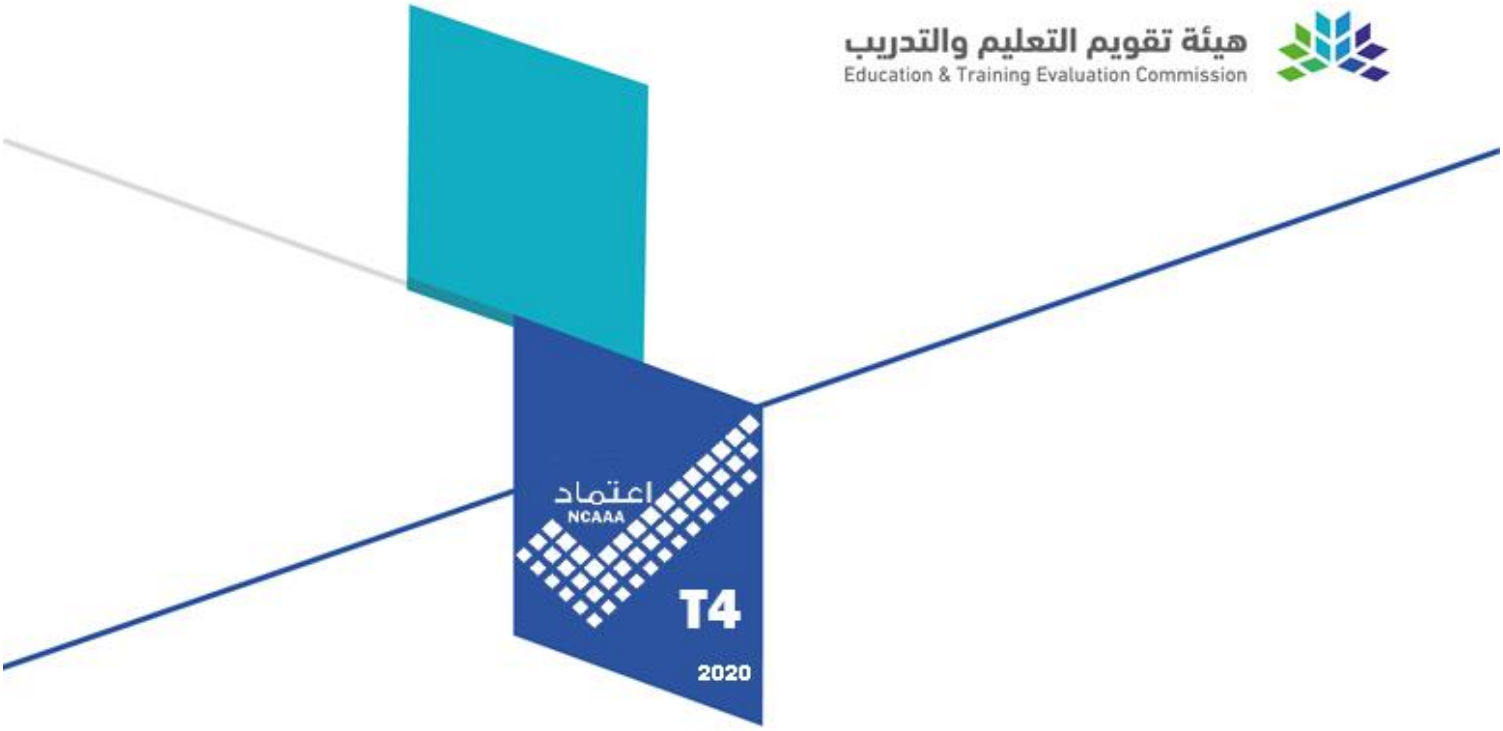
هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission



Course Specifications

Course Title:	Complex Analysis I
Course Code:	MATH 413
Program:	Bachelor of Science in Mathematics
Department:	Mathematics
College:	Science
Institution:	University of Tabuk

Table of Contents

A. Course Identification **3**

6. Mode of Instruction (mark all that apply) 3

B. Course Objectives and Learning Outcomes **3**

1. Course Description 3

2. Course Main Objective 3

3. Course Learning Outcomes 3

C. Course Content **4**

D. Teaching and Assessment **4**

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods 4

2. Assessment Tasks for Students 5

E. Student Academic Counseling and Support **5**

F. Learning Resources and Facilities **5**

1.Learning Resources 5

2. Facilities Required 6

G. Course Quality Evaluation **6**

H. Specification Approval Data **6**

A. Course Identification

1. Credit hours: 03 Hours/Week
2. Course type **a.** University ☐ College ☐ Department √ Others ☐ **b.** Required √ Elective ☐
3. Level/year at which this course is offered: **L6/Y3**
4. Pre-requisites for this course (if any): **Math 311**
5. Co-requisites for this course (if any)**:** None

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	45	100%
2	**Blended**		
3	**E-learning**		
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	45
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	45

B. Course Objectives and Learning Outcomes

1. Course Description

The main purpose of this course is to introduce students to Complex Numbers & Variables, Complex Root, Complex Functions & Mapping by it, Exponential, Complex differentiation and Complex Integration: Complex Series and Singularities & Residue Theories (Cauchy's residue theorem).

2. Course Main Objective

-Students will be able to recall the basic concept of complex analysis.
-Students will be able to perform calculus on complex functions.
-Students will be able to apply analytic functions using Cauchy Riemann equations.
-Students will be able to compute Radius of convergence of a complex functions.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	

CLOs		Aligned PLOs
1.1	Students will be able to recall complex numbers and basics of complex variable functions.	K1
1.2	Students will be able to outline the fundamental concepts of Analyticity, Harmonicity, complex integrals, Cauchy's theory and its consequences and residue method..	K1
2	**Skills :**	
2.1	Students will be able to explain and interpret the Concept of complex analysis	S1,S5
2.2	Students will be able to analyze the continuity in the complex plane and differentiability of such functions and particularly the use of the Cauchy-Riemann equations	S1
2.3	Students will be able to evaluate integrals of complex functions, and apply the Cauchy-Goursat theorem and its consequences.	S1,S3
2.4	Students will be able to communicate mathematical concepts clearly.	S5
3	**Values:**	
3.1	Students will be able to develop enhanced self-learning.	V1
	Students will be able to work independently and in groups.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Introduction to complex numbers, complex plane, polar form	3 Hrs
2,3	Complex functions, Exponential, trigonometric and hyperbolic functions	6 Hrs
4	Complex Limits Theories, Continuity, Differentiability & Theorems.	3 Hrs
5	Cauchy-Riemann conditions, Harmonics Functions.	3 Hrs
6	**Mid-Exam#1**	
6,7	Harmonic Conjugate and its applications, Complex Integration: Theories, Integration Contours	6 Hrs
8,9	Cauchy integral theorem, Cauchy integral formula (proof) and its derivative and regarding examples	6 Hrs
10,11	Power series, convergence and radius of convergence, Taylor's and Laurent's series.	6 Hrs
11	**Mid-Exam#2**	
12,13	Different types of Singularities, zeros and poles, Residue and Residue theorem and examples.	6 Hrs
14,15	**Revision and final Exam**	6 Hrs
Total		**45 Hrs**

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 and Understanding**		
1.1	Students will be able to recall complex numbers and basics of complex variable functions.	Introducing new ideas through case study	Quizzes I II Midterm Exams
1.2	Students will be able to outline the		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	fundamental concepts of Analyticity, Harmonicity, complex integrals, Cauchy's theory and its consequences and residue method.	Lectures Class Discussions	Final Exams Homework assignments
2.0	**Skills**		
2.1	The students are able to explain and interpret the Concept of complex analysis	Lectures Class Discussions	Quizzes I II Midterm Exams Final Exams Homework assignments.
2.2	Study the continuity in the complex plane and differentiability of such functions and particularly the use of the Cauchy-Riemann equations		
2.3	Evaluate integrals of complex functions, and apply the Cauchy-Goursat theorem and its consequences.		
2.4	Students will be able to communicate mathematical concepts clearly.		
3.0	**Values**		
3.1	Students will develop enhanced self-learning.	Lectures Class Discussions Group discussion	Quizzes Homework assignments Group work
3.2	Students will be able to work independently and in groups.		

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Home works and Assignments and Quizzes	Weekly basis	10%
2	Mid Exam-I	6th week	25%
3	Mid Exam-II	11th week	25%
4	Final Exam	At end of the Semester	40%

***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 :
Six office hours per week in the lecturer schedule.

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Nakhlé H. Asmar, Loukas Grafakos, "Complex Analysis with Applications, Undergraduate Texts in Mathematics, Springer 2018. D. G. Zill & P. D. Shanahan," A First Course in Complex Analysis with Applications", Jones & Bartlett Publishers, New York, 2003.
Essential References Materials	Cohen, H., "Complex Analysis with Applications in Science and Engineering" Second Edition, 2007, Springer

	Brown; Churchill, "Complex Variables and Applications," 6th Ed., McGraw-Hill, 1996.
Electronic Materials	None
Other Learning Materials	None

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	1.Lecture room with maximum capacity of 30 students and equipped with White Board, Overhead projector and internet connection. 2.Library
Technology Resources (AV, data show, Smart Board, software, etc.)	Projectors
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
Effectiveness of teaching and assessment	Students	Direct and Indirect
Extent of achievement of course learning outcomes	Teachers	Direct
Quality of learning resources	Students	Indirect

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	Program and study plan committee
Reference No.	
Date	25/08/2021