Course Specification

(Postgraduate)

Course Title:	Complex Variables
Course Code:	202653-3
Program:	Master of Pure Mathematics
Department:	Mathematics and Statistics
College:	Faculty of Sciences
Institution:	Taif University
Version:	1
Last Revision Date:	20/10/2023

Table of Contents

A. General information about the course:

1. Course Identification:

1. Credit hours: (3)h					
2. Course type					
A.	☐University	☐College	☐Department	☐Track	
B.	☐Required		☒ Elective		
3. Level/year at which this course is offered: (.....3....)					
4. Course general Description:					
Some topics in complex analysis must be discussed such as: **Entire functions-Harmonic functions- The Riemann mapping theorem- Conformal mappings – compactness and convergence in spaces of analytic and meromorphic functions-** **Topics in Univalent functions and geometric function theory-Riemann surfaces- Functions of several complex variables.**					
5. Pre-requirements for this course (if any)**: None**					
6. Pre-requirements for this course (if any)**:None**					
7. Course Main Objective(s):					
1. **Study Entire functions -Harmonic functions.** 2. **Study The Riemann mapping theorem.** 3. **Study properties Conformal mappings.** 4. **Study properties of analytic and meromorphic functions.** 5. **Study some topics in univalent function theory and geometric function theory.** 6. **Study properties of Riemann surfaces.** **Study – theory of functions of several complex variables.**					

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	E-learning		
3	Hybrid • Traditional classroom		

No	Mode of Instruction	Contact Hours	Percentage
	• E-learning		
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	NA
3.	**Field**	NA
4.	**Tutorial**	NA
5.	**Others (specify)……**	NA
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	**Recognize** fundamentals definitions of analytic, harmonic and meromorphic functions	K1	Lectures, group discussion `	Exams, Quizzes, Assignments
1.2	**Describe** generalizations of functions of several complex variables.	K3	Lectures, group discussion `	Exams, Quizzes, Assignments
…				
2.0	**Skills**			
2.1	**Give some applications** for analytic and harmonic functions.	S1	Lectures, group discussion `	Exams, Quizzes, Assignments
2.2	**Demonstrate** properties of Riemann surfaces .	S5	Lectures, group discussion `	Exams, Quizzes, Assignments

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
...				
3.0	**Values, autonomy, and responsibility**			
3.1	**Participate** basic properties of Conformal mappings.	V1	Collaborative Learning Self-learning	Scientific activity
3.2	**Give** responsibility for learning some topics in univalent function theory and geometric function theory.	V2	Lectures	Assignments
...				

C. Course Content:

A	List of Topics	Contact Hours
1.	General and basic properties of entire, analytic with several examples.	3
2.	General and basic properties of meromorphic functions with examples.	3
3.	Compactness and convergence in the space of analytic functions	3
4.	Spaces of meromorphic functions, the Riemann mapping theorem	3
5.	Weierstrass Factorization theorem, the gamma function, the Riemann zeta function.	3
6.	Univalent function theory and geometric function theory.	3
7.	Analytic continuation and Riemann surfaces.	3
8.	Topological spaces and neighborhood systems.	3
9.	Midterm exam.	3
10.	Analytic manifolds, covering spaces.	3
11.	Harmonic functions, Basic properties of harmonic functions, Harmonic function on a disk.	3
12.	Subharmonic and superharmonic functions,the Dirichlet problem, Green functions.	3
13.	Entire function, Jensen's formula, the genus and order of an entire function	3
14.	Hadamard Fractorization theorem.	3
15.	The Range of an analytic function	3
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes and HomeWorks	Continues	10 %
2.	Midterm exam 1	8^{th} - 9^{th}	20 %
3.	Final exam	16^{th}	70%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	1- **Conway, John B. *Functions of one complex variable II*. Vol. 159. Springer Science & Business Media, 2012.** 2- **Taylor, Michael E. Introduction to complex analysis, Graduate Studies in Mathematics 202. Providence, RI: American Mathematical Society (AMS) (ISBN 978-1-4704-5286-5/hbk; 978-1-4704-5448-7/ebook). xiv, 480 p. (2019)**
Supportive References	**Krantz, S. G., Function Theory of Several Complex Variables (2001), American Mathematical Society: American Mathematical Society Providence,**
Electronic Materials	Lectures available in Blackboard
Other Learning Materials	**None**

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classrooms**
Technology equipment (Projector, smart board, software)	**data show**
Other equipment (Depending on the nature of the specialty)	**None**

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students, Program Leader	Direct& Indirect
Effectiveness of students assessment	Faculty, Program Leader	Direct
Quality of learning resources	Students, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct& Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	**Department of Mathematics and Statistics**
REFERENCE NO.	
DATE	October 2023

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