



Course Specification

— (Bachelor)

Course Title: Introduction to Complex Analysis

Course Code: MTH3141

Program: BSc. in Mathematics

Department: Mathematics

College: Al-Qunfudah University College

Institution: Umm Al-Qura University

Version: 2

Last Revision Date: 17/07/2024



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A. General information about the course:

1. Course Identification

1. Credit hours: (4)

2. Course type

A. University College Department Track Others
 B. Required Elective

3. Level/year at which this course is offered: (7/3)

4. Course general Description:

This course is an introductory course on Complex Analysis.
 Topics to be covered in this course includes: Introduction to complex number system, Limits and Continuity of Complex variable functions, Derivation and the Cauchy – Riemann's Equation, Analytic functions. Harmonic functions.

5. Pre-requirements for this course (if any): MTH2113

6. Pre-requirements for this course (if any): MTH2112

7. Course Main Objective(s):

The objectives of this course are to:

- introduce students to the Complex Number System
- equip students with necessary knowledge and skills to enable them handle mathematical operations, analyses and problems involving complex numbers..

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4	100 %
2	E-learning	0	0
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 	0	0
4	Distance learning	0	0



3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	36
2.	Laboratory/Studio	0
3.	Field	0
4.	Tutorial	0
5.	Others (<i>Exam, Quizzes, Activities...</i>)	4
Total		40

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 basic knowledge of complex numbers and polar coordinates Define the related basic scientific facts, concepts, principles and techniques calculus	<i>K1, K3</i>	Lecture and Tutorials	Exams, quizzes
1.2	Recognize the relevant theories and their applications in basic mathematics.	<i>K2, K3</i>	Lecture and Tutorials	Exams, quizzes
2.0	Skills			
2.1	Justify the need for a Complex Number System and explain how is related to other existing number systems	<i>S2, S4, S5</i>	Lecture and Tutorials	Exams, quizzes
2.2	define a function of complex variable and carry out basic mathematical operations with complex numbers.	<i>S1, S7</i>	Lecture and Tutorials	Exams, quizzes
2.3	Know the condition(s) for a complex variable function to be analytic and/or harmonic. State and prove the Cauchy Riemann Equation and use it to show that a function is analytic.	<i>S2, S5, S7</i>	Lecture and Tutorials	Exams, quizzes





Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.0	Values, autonomy, and responsibility			
3.1	Prepare for success in disciplines which rely complex numbers, and in more advanced mathematics which incorporate these topics.	V2	Lecture/ Individual or group work	Exams, quizzes

C. Course Content

No	List of Topics	Contact Hours
1.	Complex Numbers: 1.1 The Algebra of Complex Numbers 1.2 Point Representation of Complex Numbers 1.3 Vectors and Polar Forms 1.4 The Complex Exponential functions 1.5 Powers and Roots	10
2.	Analytic Functions: 2.1 Functions of a Complex Variable 2.2 Limits and Continuity 2.3 Analyticity 2.4 The Cauchy-Riemann Equations 2.5 Harmonic Functions	10
3.	Elementary Functions: 3.1 Polynomials and Rational Functions 3.2 The Exponential, Trigonometric and Hyperbolic Functions 3.3 The Logarithmic Function 3.4 Complex Powers and Inverse Trigonometric Functions	10
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam	6th	30 %
2.	Quizzes and homework's	During semester	20 %
3.	Final exam	End of semester	50 %

*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	Complex variables and its application (Eighth Edition) BY James Ward Brown and Ruel V. Churchill
Supportive References	A first course in complex analysis with applications / Dennis G. Zill, Patrick D. Shanahan.
Electronic Materials	<i>None</i>
Other Learning Materials	<i>None</i>

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (projector, smart board, software)	Data Show, Smart Board
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	Courses Assessment survey
Effectiveness of Students assessment		Courses Assessment survey
Quality of learning resources	Students	Courses Assessment survey
The extent to which CLOs have been achieved	Faculty Member	Post-Rubric and Course report
Periodically reviewing course effectiveness and planning for improvement	Course committee	Annual report

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Curriculum Committees
REFERENCE NO.	1





DATE

17/07/2024

