School of Information and Physical Sciences

MATH2242: Complex Analysis Callaghan

Semester 2 - 2023



OVERVIEW

Course Description Complex analysis forms a basis for not only advanced mathematical topics, including differential equations, number theory, operator theory and other 3000 and higher level courses, but also for special functions of mathematical and quantum physics. Through this, complex functions make a significant contribution to the understanding of the world in which we live. This course covers fundamental knowledge in the theory of analytical functions with applications to definite integration and culminates with study of harmonic and special functions.

Requisites

Α

This course replaces MATH3242. Students who have successfully completed MATH3242 cannot enrol in MATH2242.

Assumed Knowledge	MATH2310
Contact Hours	Callaghan
	Lecture
	Face to Face On Campus
	3 hour(s) per Week for Full Term

10

Tutorial Face to Face On Campus 1 hour(s) per Week except week 1 and week 8

Unit Weighting Workload

Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.



CRICOS Provider 00109J



CONTACTS

Course Coordinator

Callaghan Dr Ravi Pethiyagoda Ravi.Pethiyagoda@newcastle.edu.au (02) 4055 0150 Consultation: On appointment

Teaching Staff

School Office

School of Information and Physical Sciences SR233, Social Sciences Building Callaghan CESE-SIPS-Admin@newcastle.edu.au +61 2 4921 5513 9am-5pm (Mon-Fri)

Other teaching staff will be advised on the course Canvas site.

SYLLABUS

Course Content	 Introduction to complex numbers Functions of complex variable Differentiation of functions of complex variables Cauchy's integral theorem The calculus of residues Series expansions Contour integration Conformal mappings and further results on analytic functions Harmonic functions 		
Course Learning Outcomes	On successful completion of this course, students will be able to: 1. Calculate and manipulate series expansions for analytical complex-valued functions.		
	2. Manipulate and evaluate contour integrals in the complex plane.		
	3. Evaluate definite integrals using Cauchy's residue theorem.		
	4. Relate the algebraic and geometric properties of conformal mappings, and apply these to determine the properties of analytic functions.		

Course Materials Lecture Materials:

- Lecture notes available through the course Blackboard site.



SCHEDULE

Week	Week Begins	Торіс	Learning Activity	Assessment Due
1	17 Jul	Introduction to complex	Tutorial	
		numbers		
2	24 Jul	Functions of C.V.	Tutorial	
3	31 Jul	Elementary Functions	Tutorial	Assignment 1
4	7 Aug	Integrals	Tutorial	
5	14 Aug	Integrals	Tutorial	
6	21 Aug	Series	Tutorial	Assignment 2
7	28 Aug	Calculus of residues		
8	4 Sep	Test revision	No tutorial	In-class quiz (in the 2h
				lecture time)
9	11 Sep	Calculus of residues	Tutorial	Assignment 3
10	18 Sep	Analytic continuation	Tutorial	
	Mid Term Break			
		Mid Ter	m Break	
11	9 Oct	Mobius transformation	Tutorial	
12	16 Oct	Revision	Tutorial	Assignment 4
13	23 Oct			
Examination Period				
Examination Period				

ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Written Assignments	Weeks 3, 6, 9, and 12	Individual	25%	1, 2, 3, 4, 5
2	In-class quiz	In class in week 8	Individual	25%	1, 2
3	Formal exam	Formal examination period	Individual	50%	1, 2, 3, 4, 5

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Written Assignments

Assessment Type	Written Assignment
Purpose	To develop knowledge of the course material.
Description	Regular assignments to help develop knowledge of the course content
Weighting	25%
Due Date	Weeks 3, 6, 9, and 12
Submission Method	In Class – Thursday Lecture
Assessment Criteria	Mathematical correctness and clarity of presentation
Return Method	In Class
Feedback Provided	Returned Work

Assessment 2 - In-class quiz

Assessment Type	Quiz
Purpose	To test individual student knowledge of the course material as well as analytical and problem
	solving ability.
Description	In-class quiz
Weighting	25%
Due Date	In class in week 8



Submission Method	In Class
Assessment Criteria	Mathematical correctness and clarity of presentation
Return Method	In Class
Feedback Provided	Returned Work

Assessment 3 - Formal exam

Formal Examination
To test individual student knowledge of the course material as well as analytical and problem solving ability.
Formal Exam
50%
Formal examination period
Formal Exam
Mathematical correctness and clarity of presentation
Not Returned

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Communication methods used in this course include:

Methods

Course Evaluation Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas) As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the <u>Oral Examination (viva) Procedure</u>. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the <u>Student Conduct Rule</u>.



Academic Misconduct	All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35.
Adverse Circumstances	 The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where: the assessment item is a major assessment item; or the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system; you are requesting a change of placement; or the course has a compulsory attendance requirement. Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at: https://policies.newcastle.edu.au/document/view-current.php?id=236
Important Policy Information	The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/no-room-for/policies-and-procedures that support a safe and respectful environment at the University.

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

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