MATH304 – Complex analysis

Course objective

This course is aimed to provide an introduction to the theories for functions of a complex variable. It begins with the exploration of the algebraic, geometric and topological structures of the complex number field. The concepts of analyticity, Cauchy-Riemann relations and harmonic functions are then introduced. The notion of the Riemann sheet is presented to help student visualize multi-valued complex functions. Complex integration and complex power series are presented. We then discuss the classification of isolated singularities and examine the theory and illustrate the applications of the calculus of residues in the evaluation of integrals.

Students will be equipped with the understanding of the fundamental concepts of complex variable theory. In particular, students will acquire the skill of contour integration to evaluate complicated real integrals via residue calculus.

The prerequisites are some knowledge of calculus (up to line integrals and Green's theorem), and some basic familiarity with differential equations would be useful.

Instructor

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Textbook

"Applied Complex Variables for Scientists and Engineers," by Y.K. Kwok, Cambridge University Press (2002).

Course content

		Number of lectures
1.	Complex numbers	3
2.	Functions and limits; Analyticity and harmonic functions	5
3.	Exponential and trigonometric functions	3
4.	Contour integration, Cauchy theorem and Cauchy integral formula	5
5.	Taylor and Laurent theorems; Classification of singularities	4
6.	Residue calculus: evaluation of integrals	6

Grading policy

First 75-minute test (covering Topics 1 and 2)	30%
Second 75-minute test (covering Topics 3 and 4)	30%
100-minute final examination (covering Topics 5 and 6)	40%
Six sets of homework	0%