MA 671 001 Spring 2020

Complex Analysis 1

P. D. Hislop

MWF 2:00-2:50 POT 341

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Office Hours: Monday, Wednesday, and Friday 1:00–2:00 PM, or call or email

The purpose of this course is to present the basic elements of complex analysis. After reviewing complex algebra and basic complex values functions, we'll define the complex derivative and discuss many properties of analytic functions. We'll then study line integrals in the complex plane and study one of the fundamental theorems of contour integration, Cauchy's Theorem. This basic theorem will allow us to obtain Cauchy's formula for derivatives and prove the infinite differentiability of analytic functions. We'll review power series and establish the link between analytic functions and power series representations. Other applications of Cauchy's Theorem include the Schwarz reflection principle and Morera's Theorem. We'll then turn to the study of meromorphic functions: Laurent expansions, poles, residues, and the Residue Theorem. We'll finish by studying conformal mappings.

Required text for the course:
E. M. Stein and R. Shakarchi, *Complex Analysis*, Princeton Lectures in Analyisi II, Princeton University Press, Princeton NJ, 2002.

We'll cover chapters 1, 2, 3, parts of Chapter 8, and others if time permits.

Highly recommended text: J. E. Marsden and M. J. Hoffman, *Basic Complex Analysis*, Third Edition, W. H. Freeman, New York, 1998. (Any edition will do as a good reference.)

Course Requirements: MA 575 Principles of Analysis

Grading: There will be about 8 problems sets. Students will have at least a week to complete them. There will be two in-class exams and a final exam. Target dates for the hour exams: Wednesday 19 February and Wednesday 1 April. Final exam: 4 May 3:30 PM – 5:30 PM.