McGill University
Department of Mathematics and Statistics

MATH 316 (Complex Variables)
COURSE OUTLINE – Fall Semester 2007

Instructor: Dr. Pengfei Guan (Burnside Hall 918),
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Office hours: Tuesday & Thursday, 10am-11:30am, or by appointment.
Course Webpage: http://www.math.mcgill.ca/guan/courses/m316.html

Textbook: *Complex Variables with Applications* by A.D. Wunsch, 3rd ed. (Addison-Wesley)

References:

(1) *Complex Variables and Applications* (6th Ed, McGraw-Hill), by Brown and Churchill.
(2) *Complex Variables* by M.R. Spiegel (Schaum's McGraw-Hill).

Course Outline:

(1) *Analytic functions of one complex variable:* limits, continuity, differentiation, analytic functions, Cauchy-Riemann equation, harmonic functions.
(2) *Elementary functions:* basic properties of the exponential, trigonometric, hyperbolic, logarithmic and inverse functions, concept of branches.
(3) *Complex integration:* Integrals of complex-valued functions, contour integrals, Cauchy Theorem, Cauchy's Integral Formulas, the Argument Principle, Rouche's Theorem and applications.
(4) *Infinity Series:* convergence of power series, Taylor's series, Laurent expansion, singularities, residues, the Residue Theorem, Cauchy principal value integrals and Fourier transforms integrals.
(5) *Complex inversion integrals for Laplace Transforms:* applications to heat and wave equations.
(6) *Conformal Mappings:* maximum modulus theorem, properties of conformal mappings, Schwarz-Christoffel transformation, Dirichlet and Neumann problems for Laplace's equation, complex potential and applications.

Assignments: There will be six assignments, due on following Thursdays by 5:00pm: Sept. 20, Oct. 4, 18, Nov. 1, 15, 29. *NO LATE ASSIGNMENTS WILL BE ACCEPTED.*

Middle Term Tests: to be scheduled.

Final Examination: to be scheduled.

Marking System: Assignments 15%; Tests 35%; and Final Examination 50%.

The Senate of the University has resolved that the following statement be included in this course outline: "McGILL UNIVERSITY VALUES ACADEMIC INTEGRITY. THEREFORE ALL STUDENTS MUST UNDERSTAND THE MEANING AND CONSEQUENCES OF CHEATING, PLAGIARISM AND OTHER ACADEMIC OFFENSES UNDER THE CODE OF STUDENT CONDUCT AND DISCIPLINARY PROCEDURES (see www.mcgill.ca/integrity for more information)."