The shortest path between two truths in the real domain passes through the complex domain

— Jacques Hadamard

About the course:
The theory of functions of a complex variable, an incredibly fertile branch of mathematics, has been called "the joy of the nineteenth century".

What is initially surprising is that differentiable complex functions behave *better* than their real counterparts. Many of the "pathologies" – or physically unexpected bad behaviour of real functions – are absent in complex analytic functions. The requirement of complex differentiability imposes strong conditions; so much so that knowing just a piece of a complex analytic function is sufficient to recover the whole.

This essential rigidity of complex analytic functions in turn allows a large amount of flexibility when integrating, and yields beautiful formulas for the evaluation of real and complex integrals. The rigidity imposed by differentiability is of an essentially geometric nature, and this permits us to use complex functions to solve many problems in electrostatics, heat flow, and fluid mechanics.

This course is an introduction to the theory of functions of a complex variable, intended for students in Mathematics, Physics, and Mathematics and Engineering. We will focus on a careful development of the theory as well as some applications to physical problems.

Grading Scheme:

Homework	30%
Midterm Exam	30%
Final Exam	40%

There are twelve homework assignments each term, and the lowest two grades each term will be dropped when computing the homework mark.

The homework is due Wednesday, at the beginning of class. The first homework assignment is due on Wednesday, September 23.

Web resources:
A description of the course, as well as links to the list of lecture topics and homework assignments can be found at:

http://www.mast.queensu.ca/∼mikeroth/Math326/about.html

There will be a Web CT site for the course where you will be able to check your grades (or post questions to the class, although this seems hardly to be done anymore). You can log in to Web CT from the above page, or directly from the university's Web CT page.

Rough Syllabus:

1. Complex numbers, their arithmetic, and the complex exponential.
2. Analytic functions, Cauchy-Riemann equations, harmonic functions.
3. Integrals, the theorems and formulas of Cauchy, applications.
4. Series representations, Taylor and Laurent series.
5. Zeros and poles, residues.
6. Applications of residues to the calculation of integrals.
7. Conformal mappings.

A more detailed list is available on the course home page.

Important Dates:

Midterm	Oct. 20	7–9pm
Final	TBA	TBA

Other resources:
Don't forget about the *Math Help Center* in Jeff 201, open from 9:30am to 6:30pm. The tutors there can help answer your questions (although you might have to look at the chart to make sure there is someone on duty who understands complex analysis).

Textbook: *Fundamentals of Complex Analysis (with applications to Engineering and Science)*, by Edward Saff and Arthur Snider, third edition.

Academic Integrity: As in every course at Queen's, adherence to the University's guidelines on academic integrity is both expected and required. A description of the expectations can be found at:

http://www.queensu.ca/artsci/integrity/student/index.html

In particular, while it is fine to discuss homework problems with other students, the written work submitted must be your own.

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