

Course Outline for Mathematics 406 (3 credits) Term 1, Sept.-Dec., 2012
Variational and Approximate Methods in Applied Mathematics

Prerequisites: MATH 400 and one of MATH 307, CPSC 302
Credit: 3 Credits. Credit only given for one of Math 405 or 406.
Instructor: Anthony Peirce, **Office:** Mathematics Building 108
Home Page: <http://www.math.ubc.ca/~peirce>
Office Hours: Monday: 5-6 pm, Wed: 5-6, Fri: 3 pm-3:55 pm.
Assessment: The final grades will be based on homework (45%) (including MATLAB projects), an in-class midterm exam (15%) and a final exam (40%). **Assignments are to be submitted in hard-copy from at the designated class – no late assignments can be accepted. There will be no make-up midterms.**
Test Date: Monday November 5th.

Topics	Lectures
Introduction to numerical methods: Interpolation and Integration	6
Variational and Green's function methods for ordinary differential equations including an introduction to finite element methods	12
Initial value problems for ordinary differential equations: explicit and implicit one step methods, multi-step methods, convergence	6
Green's functions for elliptic equations: finite difference, finite element and boundary element formulations for Laplace's equation	6
Evolution equations: parabolic and hyperbolic equations, the method of lines, Lax's Convergence theory, von Neumann Stability analysis.	5
Test	1
Total	36