General Note: The contents of the course is given in the general introduction of the series of the courses. But they will also depend on students’ interests. Here I give you the actual contents from the last time the course was taught.

**M597G Contents**

**Introduction to Applied Mathematics II**  
(Spring 2002)


I. **Calculus of variations** (4 weeks): Euler-Lagrange equations; constraint problems; Hamilton’s principle; applications: The brachistochrone problem and geodesics in Schwarzschild metric.

II. **Partial differential equations** (4 weeks): Green’s functions and fundamental solutions; eigenfunction expansions and Galerkin’s method; Sobolev space and weak solutions.


III. **Asymptotic expansions** (1.5 weeks): Laplace method; method of steepest descents; method of stationary phase.

IV. **Regular perturbation theory** (3.5 weeks): Oscillations and periodic solutions; perturbation of eigenvalues; Lyapunov-Schmidt method.

  Covering flow past a cylinder, elastica equation, bifurcation, the advance of the perihelion of Mercury to the 42.9 seconds of arc per century.

V. **Singular perturbation theory** (two lectures): Initial value problems; boundary value problems. Covering boundary layer and long time damping with selection of fast and slow variables.

VI. **Wavelet analysis** (approximately 1 week). No time and no special interest from students.

VII. **Stochastic differential equations**, Black-Scholes model (approx. 2 wks). No time although there is interest from some students.
Summary

The first four weeks follow the text book closely. The next four weeks I typed the lectures and loaded up on the web.

The style of the lectures is problem oriented and problem solving driven. Students liked it.

Enrollment was 11 in the first week. An additional student enrolled later due to cancellation of his other class. At finish, there were 8 left. I gave seven (7) A’s and one B. There were three late drops, citing family and other similar reasons, but all said that the course was good for them. One early drop without reason.

Five from ME. Two from math. Two from EE, one each from Econ, AERSP, CH E. (To be politically oriented )Gender: two females.

Students’ evaluation: Math students want more materials and in more depth. Engineering students want more clarity. Homework was not returned promptly. Most said that the instructor made it clear that the course is significant.