KMA381
Calculus of Variations

Lectures

This unit will be taught by Prof Larry Forbes in 2012. The lectures are on:

- Monday 1 pm  Physics Lecture Theatre 3
- Wednesday 10 am  Physics Lecture Theatre 3
- Friday 1 pm  Physics Room 333.

We’ll have a tutorial every second week. I think its time will be:
- Thursday 10 am  Geology 230: weeks 2, 4, 6, 8, 10, 12.

Content of the Subject

The subject will aim to cover the following topics:

1. **Introduction.**
   Review basic calculus of more than one variable. Extrema, maxima and minima. The Lagrange multiplier technique. The “simplest problem” of the Calculus of Variations.

2. **The Euler equation and application to classical problems.**

3. **Generalizations.**
   Several unknown functions. Propagation of light rays in 3D space. Euler’s equation for a curve in parametric form. Functionals containing higher-order derivatives. Several independent variables. Minimal surfaces.

4. **Variational Problems with Subsidiary Conditions.**

5. **Application to Mechanics and Physics.**

6. **Direct Methods.**

7. **Optimal Control.**


Assessment
The assessment for this unit consists of:

- Three-hour Exam (4 or 5 questions) 70%
- Assignments (5 or 6 of them) 30%

Reference Texts

There are quite a few books that deal with Calculus of Variations. Some of these are:


Three classic texts that deals with Calculus of Variations are:


There are other books on the topic in the library

I’ll put copies of the assignments on my web page, at [http://www.maths.utas.edu.au/People/Forbes/Classes.html](http://www.maths.utas.edu.au/People/Forbes/Classes.html)