

Variational Methods and Optimal Control

Honours Project

Matthew Roughan
<matthew.roughan@adelaide.edu.au>

1 Introduction

Students studying VMOC at Honours or Masters level are expected to undertake additional assessment. This will take the form of a project.

I am happy to discuss the details of potential projects with students, however, the default option is to write a brief history of the Calculus of Variations.

You could summarize the overall history, focus on one particular development in the field, or even consider the history of a single interesting problem in the Calculus of Variations. You might start by finding an interesting research paper in the area, or by researching a particular problem.

2 Learning and Teaching Goals

There are several goals for the project

- Development of communications skills: It is important that one be able to communicate results, or they will have little impact on business or society.
- Obtaining a deeper understanding of the Calculus of Variations, and the mathematical process in general, through seeing how it was developed.
- Teaching me something: I am always ready to learn something interesting and new, and this provides a welcome opportunity.
- Development of research skill, in particular the ability to research a topic through the science literature.
- Learning to think critically through working out what topics are interesting and important (the history is too large to write completely).

3 Logistics

I am imagining that a successful project will take about 40 hours work. I do not expect you to solve any fundamental problems, or do novel research. I do expect you to be able to think for yourself, read, research and write.

Other details:

- Projects should be less than 3000 words, and ideally would be prepared using LaTeX, in a two column format, single spaced, with 11 or 12 point font.
- Projects must be emailed to me before the exam. Please use the following as the subject of your email: "VMOC 2013 PROJECT".
- Please use PDF format (word files will get a mark of 0).
- Please insure that your name and student number are prominent on the report.

4 Assessment

Assessment will be based on two factors:

- **50%** presentation of the report, important factors being:
 - a good overall report structure
 - illustration of the understanding of research methods (e.g., use of references)
 - clear explanations, arguments well ordered and logical
 - good grammar, correct spelling, terms defined before use, clear diagrams, etc.
 - making it enjoyable to read
- **50%** content
 - careful description of principles
 - demonstration of understanding
 - accuracy
 - how interesting your choice of particular topics is

The project will be worth 10% of the total marks for the subject, replacing 10% of the value of the exam in the 3rd year equivalent assessment.

5 Alternative projects

Please discuss it with me in person if you wish to undertake a different project. In this case, it must be related to your course work, and contain a roughly equivalent amount of work as the one described above.