Maths and Statistics Part C: Writing a dissertation[1]

November 2015

[1] A few of these slides are based on a "Guidance on Projects" presentation for FHS Mathematics – grateful acknowledgements.

Plan for this session

- Some information from the Guidance Notes
- Structuring a dissertation
- Referencing, examples
- Reminders

Some information from the Guidance Notes

The Guidance Notes for Part C dissertations are available at

`http://www.stats.ox.ac.uk/current_students/bammath/projects`

- Reminder: the Part C dissertation is 37.5% of Part C.
- "The dissertation should not exceed the equivalent of 10,000 words (excluding diagrams, tables, references and texts of computer programs)."

  So maybe around 40 pages? (Depending on how you format it, how many figures, tables, etc.)

Some information from the Guidance Notes

- Deadline: **12 noon, Monday week 10 of Hilary Term**.
- Where: hand-in at **Exam Schools**, in an envelope addressed to *Chairman of Examiners, Honour School of Maths and Stats (Part C)*.
- What: **2 paper copies** of dissertation, and
  1 pdf copy (on CD, or USB stick), and
  a declaration of authorship,

  all in **one envelope**.

  Both paper copies must be bound (soft binding is fine).
- Electronic PDF copy must be **identical** to the paper copies, and may be used by the examiners to check for plagiarism.

Penalty tariffs for late submission

Don't be late!

Without permission from the Proctors to submit late:

Lateness	Cumulative mark penalty
Up to 4 hours, i.e. up to Monday 4pm	1
4–24 hours, i.e. up to Tues 12 noon	10
24–48 hours, i.e. up to Weds 12 noon	20
48–72 hours, i.e. up to Thurs 12 noon	30
72–96 hours, i.e. up to Fri 12 noon	40
96–101 hours, i.e. up to Fri 5pm	50

E.g. if a dissertation worth 65 marks is submitted 20 hours late, the penalty is 10 marks, so final mark $= 65 - 10 = 55$.

Programming and code

From Section 3.2:

> *Where projects contain a substantial amount of programming, candidates are encouraged to include key elements of their commented code in an appendix to the dissertation. This appendix will not contribute towards the word-count.*

- And, somewhere in the main body of the dissertation (i.e. not in appendix) sensible to say that you have included R code in appendix and to make some comments about it. (If it's particularly complex R code, you may want to make more than just a few comments, e.g. you might need explain an algorithm – the explanation being "mathematical," NOT R code.)
- Readers of your dissertation will be interested to know if you've done programming yourself – and if you don't tell them, they won't know.

Sample chapter

From Section 2.6:

> *By the end of week 1 of Hilary Term (or earlier), it is strongly recommended that you give a sample chapter of your dissertation to your supervisor and ask them for feedback on your work. In particular, this would be a good time to have a discussion about avoiding plagiarism (unless you have already discussed this).*

Marking

From Section 3.2:

Marks will be awarded in the following proportions:

- *Mathematics/Statistics or Data analysis/simulation 50%*
- *Content 25%*
- *Presentation 25%.*

Marking

"*Mathematics/Statistics*: Proofs and assertions should all be correct, written in your own words, and illustrated using your own worked examples. In applied topics, the derivation of the model should be properly justified.

Data analysis/simulation: The data analysis has to be correctly and suitably done, including the choice of model. Similar comments apply to simulation.

Content: You must do more than rehash text books and lecture notes. You should use multiple original sources, and present the material in your own words with your own critical overview. The Examiners are looking for your thoughts and contributions."

The main thing to notice: "... your own ...".

Marking

"*Presentation*: The mathematics must be clear and well laid out; formulae must be clearly presented, tables and graphs properly referenced in the text; an abstract and a bibliography must be provided; the English should be clear and grammatically correct. Give some thought to notation, choice of typeface, and numbering of equations and sections. Do not fail to number the pages. Finally, be sure to supply complete and accurate references for all the sources used in completing the project, and be sure to cite them properly in the text. Section 2 above gives detailed advice on this, and Appendix A below gives further general information on plagiarism and on the seriousness of plagiarism."

Structuring a dissertation

Write with a reader in mind, e.g.

- yourself before you started on your project
- a friend at a similar stage (Part C level)
- maybe an examiner – but remember that although an examiner could be an expert, **an examiner may have little/no knowledge of your particular topic**.

Perhaps a friend at a similar stage is the best example: your work needs to be clear enough for your friend to understand it.

Structuring a dissertation

Some suggestions:

- You'll need to introduce your topic, explain what you are going to cover, the motivation for your work, why it is interesting, ...
  – a summary of how your dissertation is organised is a good idea.
- You'll probably need a small number of chapters (or sections) in which you do the main work.
- You'll need an end, e.g. some conclusions to your work, or a summary of what you've done and what insights you've gained, or ....
- You'll need a title page, an abstract, any acknowledgements, a contents page, ..., a bibliography.

Possible structure

- Title page
- Abstract
- Acknowledgements
- Table of contents
- Chapter 1 = introduction
- Chapters 2, 3, 4 = the main work
- Chapter 5 = conclusions
- Bibliography

This is a guide, of course you can vary from it, e.g. it is completely reasonable not to have 5 chapters!

But most of these things should be there (e.g. titlepage, abstract, contents, conclusions, bibliography).

Signposts

- Chapter 1 = introduction

  A very good idea for the intro to contain, e.g. as the last paragraph or two of the intro, an outline of the remainder of the dissertation – signposts help the reader get a feel for the structure and let them know roughly what is coming.

- Chapters 2, 3, 4 = the main work

  Signposts at the start of each chapter are good too.

Referencing

- List references with full bibliographic details in a "Bibliography" (or "References") section at the end of your dissertation
  - you don't want too few references (maybe aim for $\geqslant 10$?)
  - if you list something in the bioliography, you should refer to it at least once in the main body of the dissertation.
- Refer to the references at the relevant points in the text of your dissertation
  - to help make your work self-contained
  - to give credit where credit is due
- You must avoid plagiarism. [Reminder: plagiarism = taking someone else's writings or ideas and using them as if they were you own.]
- You don't need to give references for facts that are common knowledge in your discipline. E.g. In a Part C dissertation there is no need to give references to common facts from Parts A+B.

Examples

A paper:

Lauritzen, S. L. and Sheehan, N. A. (2003). Graphical models for genetic analyses. *Statistical Science*, **18**, 489–514.

A book:

Venables, W. N. and Ripley, B. D. (2002). *Modern Applied Statistics with S*. Fourth Edition. New York: Springer.

To cite R:

R Core Team (2013). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL `http://www.R-project.org/`.

Some examples

- Describing results other people have obtained:

  "Winston [67] has shown that this dynamic policy minimizes the mean delay of customers in the system. Weber [61] extended this result to arbitrary arrival streams and service times with non-decreasing failure rate."

- Describe how we are about to use someone else's work:

  "We now use the general framework of Harrison [20] to obtain an approximating limiting version of the scheduling problem specified in Section 2.2. Our form of routing control is not specifically covered in [20], but it can be included in the model by using a method similar to that described in Section 9 of [20] for the inclusion of input controls."

- Explain how we are applying someone else's result to our situation:

  "The conditions of Theorem 7.1 of Meyn and Tweedie (1993) are satisfied by the test function $V(j) = z^j$ for $j \geqslant 0$, with $z > 1$ and sufficiently close to 1. So, applying that theorem, $m(\cdot)$ is exponentially ergodic in the terminology of Meyn and Tweedie (1993). In particular, π exists and $E[m(t)] \to \sum_{j \geqslant 0} j\pi(j) < \infty$ as $t \to \infty$."

- Look at example paper:

  `http://projecteuclid.org/euclid.ss/1340110864`

Referencing

In summary: it should be clear what is your own work and what is someone else's, and if you have used someone else's work it should be clear how you have used it.

Referencing other people's work or ideas does not diminish the quality of your work, it enhances your work (and is essential).

Reminders

- Aim to give a sample chapter to your supervisor by early in HT.
- Aim to get a first draft finished by week 6 of HT. **Proofread** it carefully before giving it to your supervisor for comment.
- You must submit the final version by 12 noon, Monday week 10 of HT (at the Exam Schools).