UNIVERSITY OF OXFORD
Mathematical Institute

Mathematical and Statistical Dissertations Part C and OMMS

Christopher Hollings
Mathematical Institute

Neil Laws
Department of Statistics

Fridays@2, MT24, Week 5

Oxford Mathematics

Plan for this session

UNIVERSITY OF OXFORD
Mathematical Institute

- Some information from the Guidance Notes
- Structuring a dissertation
- Referencing, examples
- Reminder
- Some information specific to Stats

Dissertation Guidance

- There is a webpage containing important information about dissertations and, in particular, a link to the Dissertation Guidance.

Some information from the Guidance Notes

UNIVERSITY OF OXFORD
Mathematical Institute

- Reminder: a dissertation is worth the equivalent of 2 units.
- The word limit for dissertations is 7,500 words, which usually equates to 25-30 pages.
- The word count excludes the table of contents, all mathematical equations and symbols, diagrams, tables, bibliography and the texts of computer programs.
- There is a page limit of 50 pages; the page limit includes all materials, except code.

Timeline

Mathematical Institute

- MT Week 1, Wednesday noon: Deadline for submitting dissertation choices
- MT Week 2: Students notified of project allocation
- MT Weeks 7 and 8: First meeting with dissertation supervisor
- HT Weeks 1-8: 3 further supervision meetings
- HT Weeks 7-8: Oral presentations take place
- **Deadline: 12 noon, Monday, Week 1 of Trinity Term.**

Supervision

UNIVERSITY OF OXFORD
Mathematical Institute

- Each supervisor might supervise 1-4 students working on (broadly) the same topic.
- You should expect 6 hours of supervision for a groups of 4 students. It could be longer group meetings or shorter individual meetings.
- Your supervisor will give you some feedback about writing but they will not proofread or copyedit your dissertation.

Handing in

- Deadline: Monday noon, Week 1, Trinity Term
- All submission is electronic, with your dissertation as a pdf
- Details of the submission process with be circulated closer to the deadline

Penalty tariffs for late submission

UNIVERSITY OF OXFORD
Mathematical Institute

Don't be late! The following penalties expected to be confirmed in the Exam Conventions this term. Without permission from the Proctors to submit late:

Lateness	Mark penalty
Up to 4 hours	1
4–24 hours	10
24–48 hours	20
48–72 hours	30
72 hours – 14 days	35
More than 14 days late	Fail

Marking

Mathematical Institute

The dissertation will be read and double blind marked by your supervisor and another assessor. If necessary, the marks are reconciled to give the overall mark awarded. The reconciliation of marks is overseen by the board of examiners and follows the department's reconciliation procedure.

Marking

Mathematical Institute

When writing your dissertation, you should be aware of how it will be assessed and marked:

- Mathematics/Statistics or Data analysis/simulation 50%
- Other content 25%
- Presentation 25%.

History of Mathematics dissertations which are marked according to

- Content 75%
- Presentation 25%.

These proportions are broken down further in the Guidance.

Marking

Mathematical Institute

Maths/Stats or Data analysis/simulation 50%

- Difficulty 20%
- Correctness 20%
- Comprehensiveness 10%

Other content 25%

- Coherence 10%
- Individuality 15%.

Presentation 25%

- Narrative 10%
- Clarity 15%.

Marking

Mathematical Institute

Maths/Stats: correct and written in your own words, derivations justified, and and illustrated with your own examples

Data analysis/simulation: similarly

Content: do more than rehash textbooks and lecture notes –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

Mathematical Institute

Presentation:

- Maths/stats clearly typeset and well laid out
- Tables and graphs properly referenced in the text
- Abstract and a bibliography must be provided
- The English should be clear and grammatically correct
- Sources used should be properly cited

There are lots of resources on the departments' websites (and elsewhere online) regarding LaTeX.

Structuring a dissertation

Mathematical Institute

Write with a reader in mind, e.g.

- yourself before you started on your project
- a friend at a similar stage (Part C/Masters 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

Mathematical Institute

The tasks of writing correct mathematics and explaining mathematics well are very different. It can become very easy to focus on the former and less on the latter. Being able to step back from the details and view a chapter or the dissertation as a whole is important.

Structuring a dissertation

Mathematical Institute

- You'll need to introduce your topic, explain what you are going to cover, the motivation and/or historical context for your work, why it is interesting, key examples might be introduced here,... – a brief 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, perhaps a discussion of what further you might have discussed, related or more advanced problems, other approaches etc. or ....
- You'll need a title page, an abstract, any acknowledgements, a contents page,..., a bibliography.

Possible structure

Mathematical Institute

- 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 deviate from it, e.g., by not having 5 chapters

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

Introduction

Mathematical Institute

- In an introduction you should frame the dissertation, explain something of the history of the problem or the theory and why it is of interest.
- This is a good place to introduce notation, background definitions and theory and key examples that you will return to through the dissertation.
- Describe the key results of your dissertation. Obviously, you will need to have introduced enough vocabulary and examples that this is not an abrupt shift of narrative.
- After a good introduction the reader should be keen to read on and have a good sense of what content lies ahead.

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.

What to include

Mathematical Institute

- While writing and planning the dissertation the word count of 7,500 may seem rather tight, but the word count should help you keep a reasonable handle on how much to write and what to include.
- Crucial definitions, examples and results will need to be introduced, and cannot be omitted, but not everything will need proving, especially if the proof of a theorem has no particular bearing or impact on the remainder of the dissertation. In this case quote the result and provide a suitable reference.
- Don’t be completist, or verbose. Tangential or irrelevant asides should be avoided.
- By planning early, it should be clear if the word count looks like it is going to be significant problem. Then you need to think carefully about what to omit. It would be a great shame to write up a lot of material only for it to need removing in a later draft.

Referencing

Mathematical Institute

- 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 bibliography, 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
- You don’t need to give references for facts that are common knowledge in your discipline (e.g., common facts from Parts A+B).

Examples

- Tip: use BibTeX. Bib entries could be copied from https://mathscinet.ams.org/ or https://scholar.google.com/
- Lauritzen, S. L. and Sheehan, N. A. (2003). Graphical models for genetic analyses. *Statistical Science*, 18, 489–514.
- Venables, W. N. and Ripley, B. D. (2002). *Modern Applied Statistics with S*. Fourth Edition. New York: Springer.

Examples

- Describing results other people have obtained:
  - “Smith (2010) has shown that…”
- Describing how we are about to use someone else’s work:
  - “We now use the general framework of Smith (2012) to obtain an approximation to…”
- Explain how we are applying someone else’s result:
  - “The conditions of Theorem 7.1 of Smith (2015) are satisfied by our function *f*, therefore…”

Referencing

UNIVERSITY OF OXFORD
Mathematical Institute

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).

Originality

Mathematical Institute

- Few dissertations will include original research, and this is certainly not a requirement.
- Nonetheless a dissertation needs to be an original piece of work, in the sense that it offers something new to the literature.
- This might be achieved in various ways; commonly a dissertation seeks to take material available in various technical, professional sources and elucidate it for a more undergraduate/starting-graduate level.
- Other dissertations might seek to replicate known results, say about a model, the details of which aren't in the public domain.
- A dissertation is definitely not a regurgitation or paraphrasing of a chapter or two of a particular resource.

Plagiarism

Mathematical Institute

"Presenting work or ideas from another source as your own, with or without consent of the original author, by incorporating it into your work without full acknowledgement. All published and unpublished material, whether in manuscript, printed or electronic form, is covered under this definition, as is the use of material generated wholly or in part through use of artificial intelligence (save when use of AI for assessment has received prior authorisation e.g. as a reasonable adjustment for a student's disability). Plagiarism can also include re-using your own work without citation. Under the regulations for examinations, intentional or reckless plagiarism is a disciplinary offence."

Forms of plagiarism

- Verbatim (word for word) quotation without clear acknowledgement
- Cutting and pasting from the Internet without clear acknowledgement
- Paraphrasing
- Collusion
- Inaccurate citation
- Failure to acknowledge assistance
- Use of material written by professional agencies or other persons
- Auto-plagiarism (i.e. using previously submitted work)

It is recommended that you complete the university's online course 'Avoiding Plagiarism'

The Presentation

Mathematical Institute

Each student is required to give an oral presentation to their supervisor and at least one other person with some knowledge of the field of the dissertation.

This presentation forms **no part of the final assessment** of the project. It is intended to give you an opportunity to practise your presentation skills and for your supervisor to test, through questioning, your understanding of the material included in the project. It is intended that the presentations will be delivered near the end of Hilary Term.

Timing

Mathematical Institute

- It is impossible to make general statements about the timing of a dissertation – how you manage the workload will depend on how you prefer to work.
- Because much of the work will take place over vacations, you should factor in the availability of your supervisor.
- Don’t focus on the dissertation at the expense of your other courses.
- You do not have to write linearly. Indeed, the Introduction will probably be the last thing you write.
- Do not underestimate the time needed for editing.
- Whenever possible, try to take a step back and keep the overall picture in mind.

Dissertations - Statistics related

Code

- Code is best included in an appendix, not in the main body of the dissertation:

"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."

- This is saying you could include only important/representative examples of your code, not necessarily all of it
- Even if you do include code, you should describe your work in appropriate detail in the body of your dissertation (i.e. not in an appendix) so that the readers/markers of your dissertation can understand what you have done
- If there are important aspects to your code then you can also highlight these at the appropriate place(s) in the body of your dissertation

Code

- Maybe briefly mention what coding you did in the signpost section of the introduction, then explain more in the chapter(s) that need the code – flagging that your code (or extracts of it) is in an appendix
- If you only used standard packages it's still probably a good idea to indicate what you used (maybe in the signpost section of the introduction?)

Numerical results

- Think about how to present numerical results
- Output should probably be formatted appropriately, not direct cut-and-paste
- And edited down to the parts you need, not everything R (or other software) gives you
- Give results to a sensible number of decimal places

Figures

- Not too big, not too small
- The text in figures should be about the same size as the main text, maybe a little smaller (but not too small to read)
- May need to be selective about which plots to include, which tables of results to include