

Mathematical and Statistical  
Dissertations  
Part C and OMMS

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# Plan for this session

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

# Some information from the Guidance Notes

There is a webpage

<https://www.maths.ox.ac.uk/members/students/undergraduate-courses/teaching-and-learning/part-c-students/teaching-and-learning/dissertations>

containing important information about dissertations and in particular a link to the **Dissertation Guidance**.

- Reminder: a dissertation is worth the equivalent of 2 units.
- “The final dissertation should be no longer than **7,500** words, this usually equates to 25-30 pages. The word count may exclude any table of contents, all mathematical equations and symbols, diagrams, tables, bibliography and the texts of computer programs.”
- This year there will be an absolute page limit of **50** pages; the page limit includes all materials.

# Timeline

- MT Week 0, Friday: Dissertation information session
- MT Week 0, Friday: Dissertation abstracts published
- MT Week 3, Friday noon: Deadline for submitting dissertation choices
- MT Week 5, Friday: 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.**

# Handing in

- When: Monday noon, Week 1, Trinity Term.
- What: all submission is electronic.

An electronic version of your dissertation as a PDF needs to be submitted.

Details will follow closer to the deadline re the submission process.

# Penalty tariffs for late submission

## 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:

<b>Lateness</b>	<b>Mark penalty</b>
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

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

Note: a technical 'Fail' because of non-submission will result in the failure of the whole of Part C.

# Marking

The dissertation will be read and double blind marked by your supervisor and another assessor. The two marks are then 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.

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%.*

with the exception of History of Mathematics dissertations which are marked according to

- *Content 75%*
- *Presentation 25%.*

These proportions are broken down further in the Dissertation Guidance.

# 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/statistics must be clearly typeset 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.”

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

<https://www.maths.ox.ac.uk/members/it/faqs/latex>

# 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/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.

**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

Some suggestions:

- 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

- 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).

# Introduction

- In an introduction you should frame the dissertation, explain something of the problem's or theory's history and why it is of interest.
- This is a good time 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

- 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

- 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  $\geq 10$ ?)
    - 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. [Reminder: plagiarism = taking someone else's writings or ideas and using them as if they were your 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.

# Some examples

- Describing results other people have obtained:

“Smith (2010) has shown that ....

Jones (2014) extended this result to the case where ... ”

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

“We now use the general framework of Smith (2012) to obtain an approximation to ...

We describe our extension to the work of Smith (2012), which allows us to incorporate . . . , in Section 3.2 .”

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

“The conditions of Theorem 7.1 of Jones (2013) are satisfied by the test function for , with and sufficiently close to 1. Hence ... ”

# 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).

# Originality

- 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

The University's guidance on plagiarism is available at

<http://www.ox.ac.uk/students/academic/guidance/skills/plagiarism>

Plagiarism is presenting someone else's work or ideas as your own, with or without their consent, 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. Plagiarism may be intentional or reckless, or unintentional. 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)

# The Presentation

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

Finally, some comments on timing:

- It is impossible to make general statements about the timing of a dissertation. Quite when you will be doing the work and then writing up will vary from person to person, depending on other workload and the nature of the dissertation's task.

- Nonetheless it is clear that the work needs to be done over two short vacations and Hilary Term, and that planning accordingly is vital. You should also factor into this the availability of your supervisor (e.g. how easy will it be to contact them during the vacations or if they are away at a conference?)

- The work and the writing up do not need to be done one after the other. You may find it helpful to write a chapter early on, especially if you are unused to LATEX or nervous about the writing process. It is not unusual for the introduction to be the last thing written.



# Timing

- Getting maths right and explaining maths well are two different processes. This likely means you need to write logical, accurate maths first (for the more difficult results) and then revisit your writing to see how well you've explained it to your notional reader.
- Do not underestimate the time it will take to do things. Be aware – especially in term time – that other things will intrude into your life. You will only stress yourself if you don't leave enough time to write up. Plan to be done comfortably ahead of the submission deadline.
- Do not be overambitious or dedicate time to the dissertation at the expense of your other courses. Let the word count help you – if it looks like you are going to go well over the word count that should be clear early on, and you should then consider (perhaps with advice from your supervisor) what to omit or abridge.
- Learn ways to take a step back. When writing, it's very easy to become so focussed on the particular theorem or topic at hand. Having a clear narrative, structure and plan for the dissertation will help you step back from such a mindset and better judge how the dissertation is coming along as a whole.

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