1 How to write a dissertation

Alan Mycroft
Lent 2015-16
(slides mainly due to Ted Briscoe and Neil Dodgson)

2 How to write a dissertation

• what
• why
• when
• who
• how

3 WHAT is the dissertation?

• A document of about 10,000 words
• … describing your project
• … in a carefully prescribed format
• … worth a quarter of your final mark
• Due 12 noon on Friday 13 May 2016
• Vivas on Friday 10 June 2016

4 Length

• Maximum of 12,000 words
  – Including main text, tables, footnotes
  – Excluding appendices, bibliography, photographs, diagrams

• Aim for 10,000 words

• Probably the biggest formal document you’ve written

5 Reactions to the word limit

A. 10,000 words – yeah, OK.
B. 10,000 words! – I’ll never be able to write that much!
C. 10,000 words?! – I’ll never be able to fit it into 12,000 words, let alone 10,000!

Pascal (1656) “I would have written a shorter letter, but I did not have the time.”

6 Advice for terse writers
• It would be very hard to describe a Part II project properly in under 7,000 words
• So write your 7,000 words as best as you can
• Then see how you can improve your core by adding more words
  – Longer explanation of the key algorithms?
  – More results?
  – More detailed analysis of the results?

7 Advice for verbose writers (1)
• The best project write-ups fit nicely within the 12,000 word limit, rather than feeling squashed
• What are the key points you need to cover to get the marks? – cover these
• What are the fascinating but largely irrelevant side issues? – drop these
• It is especially easy to write too much in the Introduction and Preparation chapters

8 Advice for verbose writers (1I)
• You do not have to explain every function you wrote, every data structure you use, every book you read, and every interesting idea for extensions that you had
• If all else fails, write too much and then ruthlessly cut it down, preferably with help from your Supervisor (and/or Director of Studies)

9 Advice for all
• What are the key points?
  – make sure you cover these
  – some ideas for key points:
    • what did you set out to do?
    • what did you actually do?
    • how did you do it?
    • what were the results?
    • how good were the results?
• Always remember who your readers are
  – In this case they are three examiners!

10 It’s not a diary
• it is a report not a diary
• don’t write it in the order you did it
• write it in the order that will make most sense to the reader

11 Over 3000 dissertations so far
Every Part II student has had to write a dissertation.

Why not visit the library and leaf through a few?

12 WHY?
• You will write many reports in your professional life, this is good practice
• You will be judged on the dissertation, not directly on your program
• You need to present your work as well as possible
• It is worth a good proportion of your final mark

13 When?
• Finish programming, testing and results-gathering by end of Lent Term at latest
• Finish complete draft before Easter Term starts
• Give to supervisor and Director of Studies to read
• Correct and submit 2 weeks before deadline
  –Deadline: 12 noon, Friday 13 May 2016

14 Penalty
• If you submit past the deadline, you will be docked 25% of the mark
  –with a further 5% of your mark docked for each subsequent day late

• This isn’t an idle threat – we do it
  –even if you are just one minute late

15 WHO are you writing for?
• Three Computer Science lecturers
  –You may assume that they are intelligent
  –They know a lot of computer science
    • so they are not ignorant
  –They do not know the detailed area of your project
    • so you need to tell them about it
    • treat them as having just finished Part IB
  –They prefer good writing
–They will read your dissertation fairly quickly

16 They read quickly?

• Each examiner has to read 50 Part II dissertations in 2 weeks

• I can read 15,000 words/hour
  –if it’s interesting!

• So expect the examiner to spend between ¾ hour & 1½ hours on your dissertation

17 Important corollaries of this

• Be clear, be concise, tell them what you want them to know, do not expect them to realise how clever you are by osmosis

• Say things up front, don’t hide interesting stuff, you are not a mystery writer or a magician

• Do not expect them to plough through pages of boring gory detail

• Do not use code extracts when prose will do a better job

18 Provide signposts

• Your reader needs to know why they should bother to read each bit of the dissertation

• You should tell the reader
  –Where you are going
  –Why you are going there
  –How you are going to get there

19 Say everything three times

–Give an overview of what you are going to say

–Say it

–Summarise what you’ve said

• This applies
  –To whole dissertation
    •Ch.1, Ch. 2–4, Ch. 5
  –(Recursively) To each chapter
    •introduction, content, summary
  –(Recursively) To each section in a chapter

20 WHO should proof-read it?
• Supervisor
  – obviously
• Director of Studies
  – if he/she has time
• Friends
  – provided they aren’t also overloaded with work

21 Allow sufficient time
• Your supervisor and Director of Studies are busy people so:
  – Allow them enough time to read and comment (say 2 weeks)
    so they can fit it around their other commitments
  – Use them wisely – do not give them a draft that you haven’t
    checked yourself
  – Do not assume they’ll read more than one draft
  – NEVER give them a second draft if you haven’t incorporated
    their corrections from the first draft!

22 Tools
  – Microsoft Word
  – $\LaTeX$
  – your own favourite word processor
• whichever tool you use:
  – set up a template of the whole dissertation straight away
  – ensure that you can include figures, photos, equations, etc
    (whatever you need)
  – ensure that you can print it
  – find somewhere to get it bound

23 Microsoft Word
• learn to use styles (Format menu)
  • they will help you keep your typesetting consistent (e.g. all
    second level headings in the same typestyle)
  • make it easy to get section numbers automatically and
    correctly
• difficult to typeset large amounts of mathematics efficiently
• including figures neatly is often a challenge
  • easy to include figures in a clunky way

24 $\LaTeX$
• similar to a programming language
• gets all the typesetting right for you automatically
• easy to handle equations & tables – but don’t confuse $\text{different}$ and \texttt{different}.
• including figures works well, once you know how to get it to work

• Martin Richards has provided a collection of files that constitute the basis of a \LaTeX \text{X} dissertation:
  www.cl.cam.ac.uk/~mr/demodiss.tar

\textbf{25 Structure – five chapters}
1. Introduction: 2–3 pages
2. Preparation
3. Implementation
4. Evaluation
5. Conclusion: 1–2 pages
  – see the pink book for details of what should go into each of the five chapters
  www.cl.cam.ac.uk/teaching/projects/pinkbook.pdf

\textbf{26 Mark allocation}
• the pink book tells you how marks are allocated and what the examiners want to see
  – Introduction & Preparation 26%
  – Implementation  40%
  – Evaluation & Conclusion 20%
  – Presentation       14%

• It’s a good idea to make your word budget for each section approximate the mark budget.

\textbf{27 1. Introduction}
• Make it clear in the first paragraph what your project is about & how well you’ve done it
  – e.g. “My project concerns the creation of a new operating system. My OS is based on quantum uncertainty. I have successfully implemented the heart of the new OS, which I have demonstrated running a range of key operations. This implementation fulfils the requirements of my core project proposal and one proposed extension: recovering deleted files through a time-warp mechanism.”

\textbf{28 2. Preparation}
• “work done before code was written”
• show evidence of planning
• show evidence of good software practice
• explain any background

• the nature of this chapter will vary greatly between dissertations

3. Implementation
• What level of detail?
  – Too little detail
    • “I wrote a class which implemented public key cryptography using the new BWR algorithm.”
    – you need to tell the reader something about how you implemented this clever algorithm
  – Too much detail
    • “My BWR cryptography class contains six methods. The first method is called X, it has four parameters called A, B, C and D and returns an E. Parameter A is of type F, it indicates to method X exactly how many…”
    – but not so much detail that they lose the will to live

4. Evaluation
• Many projects fall down on evaluation
• You may have the most fantastic implementation ever, but you still need to evaluate it
• Allow 2 weeks for evaluation:
  – to get results
  – to analyse results
  – to get screen shots, output logs, photos, if appropriate

5. Conclusion
• Make it clear in the first paragraph what your project was about, and how well you’ve done it.

• Also say what you’d do differently if you did it again

Presentation: 14% of the marks
• primarily for being literate and tidy
• no need to spend hours on advanced graphic design or page layout
• but you do need to ensure that:
  – it is spell-checked (en_GB is fine, en_US is OK, but
inconsistent mixtures look sloppy)
– grammar is reasonable

33 Language tips
• Don't use “don't” and the like – including “it's”.
• “I” for things you've done, “we” is OK for “the reader and I”.
  Passive voice is OK, but can be clumsy.
• Hyphenate compound adjectives: “light blue ball”, “high-level language”, “a model-checking algorithm”.
• Avoid doubt and convoluted sentences: “I planned to aim at the possibility of constructing…”.
  Be definite, be judgemental.
• Plain English is good, e.g. http://www.plainenglish.co.uk/campaigning/examples/before-and-after.html
• More hints: www.cl.cam.ac.uk/~pr10/teaching/dissertation.html

34 Final words
• read the pink book
  –it tells you what you need to write
• prepare a complete template before starting to write
• ensure that you know how you'll get it printed & bound
• write clearly at an appropriate level of detail
• aim to submit 2–3 weeks early
• read the pink book
  –again, in case you missed something