

# Dissertation and Thesis Writing Guidelines

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## 1 Introduction

This document outlines several tips for writing a high quality dissertation or thesis. It is highly recommended that you read these tips carefully, and try to follow their suggestions as far as possible. There are several reasons for this:

1. The overall quality of your written work is directly proportional to the final result you will receive from your external examiners. A better quality dissertation or thesis will mean that you are more likely to receive a better final mark. Remember that the results you present are only part of what is evaluated. Excellent results can seem a lot less impressive if they are presented unclearly.
2. A dissertation or thesis that is poorly written will take longer for your supervisor/co-supervisors to read and return for comments. If there is a great deal wrong with your writing and structure, it is also very likely that your work will be returned to you with only comments on the initial parts. This will slow down your own progress, and may delay the final submission date of your dissertation or thesis (and, consequently, your graduation date).
3. CIRG maintains a high overall standard of work and professionalism. Dissertation and thesis work should thus also maintain a high standard, and be professionally presented. This reflects well on the research group as a whole, as well as its individual members.
4. Your work is more likely to be cited by other researchers if they can easily understand what you have written.

## 2 General Tips

The following tips relate to the dissertation or thesis document itself, and what approach you should use when planning and writing:

1. The absolute first thing that you need to do before you even start writing the thesis is to have a look at the finalized theses on the CIRG website. Read the abstracts, introductions and conclusion so that you can see how these should be written. Then

look at the organisation of information. Look at the way that formulas, figures, tables, the bibliography, references, appendices, and other elements are handled. You should do the same in your own work.

2. It is required that you produce your final dissertation or thesis using LaTeX. Exceptions will only be made in extraordinary situations, and this must be discussed with your supervisor and co-supervisors before you commence writing. It is highly recommended that you use the official CIRG dissertation and thesis template. It can be downloaded from the “resources” section on the CIRG website.
3. The required length of the dissertation or thesis is open to debate. To quote Professor Engelbrecht: “I get many questions as to the length of a thesis. This is difficult to say, because it depends on the type of thesis. My belief is that you write what is necessary, and that's that. However, good guidelines are that a Masters thesis is approximately 130-200 pages, and a PhD 200-300 pages. But again, when you have written all that you can say in less (or more), then that is your thesis”.
4. Always write critically. Question the findings of others, as well as your own. Highlight where your findings differ from those published by others.
5. When you discuss experimental results, do not just say what you see, but give motivations and explanations.
6. Experiments must be carefully designed. Reported experimental results must be statistically correct. If you study a stochastic algorithm, you have to report averages over at least 30 simulations per algorithm per experiment. You also have to provide statistics supporting the significance of any results. Information on experimental design and statistics may be found in Nelis Franken’s presentation, available online at [http://www.cs.up.ac.za/~nfranken/stats\\_presentation.zip](http://www.cs.up.ac.za/~nfranken/stats_presentation.zip).
7. When you use mathematical symbols or acronyms, do not overload their meaning (i.e. do not use a single symbol or acronym to mean different things). Also, do not use several symbols or acronyms to denote the same meaning. Both these practices confuse the reader.
8. Make sure that your reference bibliography is correct. Pay attention to the following:
  - 8.1. Make sure your references are up-to-date. You need to make sure that you obtain and read the most recent applicable literature.
  - 8.2. For established concepts, cite the earliest original references available (for example, if you refer to backpropagation, cite the original work of Werbos).
  - 8.3. All references in your bibliography must be cited in the body of the dissertation or thesis, must be complete, and in a consistent format. If you use LaTeX and a BIBTeX database of references, these formatting requirements will be handled automatically by the system.
9. In addition to the dissertation or thesis, please keep in mind that you will also have to fulfill the following faculty requirements before your degree is awarded:
  - 9.1. You will have to do an oral examination, in which you present the main findings of your research in the form of a presentation, and answer a few questions. Note that there is a presentation template under the “resources” section of the CIRG website which should be used as a basis for any slide show you may wish to use.
  - 9.2. Each M.Sc student has to submit at least one article to an accredited journal, while each PhD student must submit at least two such articles.

10. Professor Engelbrecht also requires the following, before signing off your dissertation or thesis submission:
  - 10.1. A CD with your thesis source, all code, all simulation data, and all publications (sources and final PDF files) derived from your work. Please use the following folder names in the root of the CD: `thesis`, `papers`, `code`, and `data`. Some of you may also have video clips and other media files, which must also be provided in appropriately named folders.
  - 10.2. It will also be appreciated if a bound copy of your dissertation or thesis can be provided for CIRG's internal library.

### **3 Dissertation and Thesis Structure**

The tips in this section relate to the organisation you should follow when writing your dissertation or thesis:

1. Before you write, plan the structure of the thesis. Begin by writing a table of contents. Decide which chapters you will need, and what order the chapters should come in, so that they form a logical flow. Divide each chapter into broad sections, and decide on their order. Do the same for each section, breaking it into subsections.
2. Each chapter should include the following, in addition to the main content:
  - 2.1. A very short paragraph at the beginning of the chapter that links the chapter to the previous chapter(s), and also states what the current chapter's main objective is. An outline should also be given of what is covered in the main sections of the chapter. You should include such a paragraph for the introduction and conclusions chapters of your dissertation or thesis as well.
  - 2.2. An introduction section, in which you elaborate more on the details you touched on in the previous paragraph. Provide detailed objectives you address in the chapter.
  - 2.3. Each chapter (with the exception of the conclusions chapter) should end in a conclusions section, where you summarise the objectives of the chapter, how these have been achieved and what the main findings were. Finally, you should introduce the next chapter and relate it to the current one, in order to maintain the flow of your writing.
3. The introduction chapter is very important. It provides the vehicle through which you set the stage for what is to come. You need to contextualise your work, and motivate why you have done it. After reading the introduction, the reader should have a precise idea of what you are doing, why you are doing this, how you are going to do this, and where the various elements of your thesis can be found. The introduction must provide the following:
  - 3.1. A statement of your objectives and how these objectives will be addressed in the remainder of the dissertation or thesis.
  - 3.2. An outline of your contributions to the field.
  - 3.3. An outline of the remaining chapters of the dissertation or thesis, to tell the reader what to expect for the remainder of the text.

4. The conclusions chapter is just as important as the introduction. Herein you must state the following:
  - 4.1. What the objectives of the dissertation or thesis were.
  - 4.2. How the objectives have been addressed.
  - 4.3. What the main findings were.
  - 4.4. Finally you should give ideas of future research that may emanate from yours.
5. Your background study should be as complete as possible. Your background needs to include all the theory, previous models, and previous work that have relevance to what you are doing. Remember that you should not assume that the reader has prior knowledge of your field (though basic computer science and programming knowledge may be assumed). You need to write to show that you understand the field, and that you can critically discuss and evaluate existing literature. Do not assume that your audience will read between the lines. Do not make fuzzy, ill-defined statements. Motivate everything you write.
6. All figures, tables, graphs and algorithms have to be referenced in the main text and be properly discussed and analysed. Captions must also be provided for all of these.
7. If you have many mathematical symbols and acronyms, define them in appendices (the thesis template provides for such appendices). This will also help you to make sure that you assign one meaning to a symbol.

## 4 Grammar, Spelling and Style

The following tips are related to grammar and spelling, as well as the correct style of writing you should use in your dissertation or thesis:

1. You must consult a language editor before submitting your dissertation or thesis. A list of recommended language editors is provided on the CIRG site, under the “resources” section.
2. Use a spell checker! If you are using LaTeX, a typical Linux distribution will provide a program called `ispell`, that will check your document for spelling errors, and make correction suggestions.
3. Checking your grammar automatically is a little more difficult. You can use the following procedure (if anyone can find a better technique, please let me know):
  - 3.1. You need to add the line `\usepackage{html, makeidx}` in the preamble of your LaTeX file.
  - 3.2. Execute the command “`latex2html dissertation.tex`” in a terminal window. This creates a folder named `dissertation`, containing a file called `dissertation.html`.
  - 3.3. Open `dissertation.html` in Microsoft Word (sorry, Linux users). You should see a page of hyperlinks to the various sections of the document. Check each sections grammar in Word. Note that you will have to manually make changes to your LaTeX files.

4. Do not make use of informal language. Your dissertation or thesis is an academic work and needs to be written formally. Keep the following in mind:
  - 4.1. Do not use words like "we", "I" and "they". Instead, write passively, in the third person. Use phrases such as "this work demonstrates that...", or "Smith's work illustrates..."
  - 4.2. Refer to everything by name. Do not make use of words like "it", "this", "these", unless there is absolutely no ambiguity.
5. Experimental work and conclusions are written in the past tense (for example, "the parameters were set to...", and "a taxonomy of techniques was presented..."). The rest of your writing should be in the present tense.
6. Try not to write sentences that are too long. Excessive sentence length can lead to poor clarity. Your writing should be like program code – keep to one concept per sentence.
7. Be sure that your writing flows properly. Each sentence, paragraph, section and chapter should follow from the previous one. The reader should at all times know what he/she is reading and why.
8. Try to avoid using forward references to definitions of terms. Define each concept before you use it, so that you conserve flow.
9. Try not to use quotes or footnotes. Footnotes tend to break the flow. Quotes give someone else's thoughts. The purpose of the dissertation or thesis is to show what you think. Remember that you need to illustrate to the examiners that you understand the material.