

THE FULL THESIS TITLE SHOULD
APPEAR HERE

A DISSERTATION SUBMITTED TO THE UNIVERSITY OF MANCHESTER
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Student ID

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Abstract

Write your abstract here: Remember, it must fit on this A4 page and should describe contents of the thesis/dissertation. Here might also be a good place to indicate what you have achieved in the thesis/dissertation

Declaration

No portion of the work referred to in the dissertation has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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Acknowledgements

I would like to thank...

Chapter 1

Using latex for your dissertation

This chapter covers the background material for my thesis and introduces the notation that I will use throughout.

1.1 The Body of Your Dissertation

Typically, the body of your dissertation is organized into a hierarchical structure, with numbered or unnumbered headings for chapters, sections, subsections, sub-subsections, and even smaller sections. The command `\section` that precedes this paragraph is part of such a hierarchy.¹ L^AT_EX handles the numbering and placement of these headings for you, when you use the appropriate heading commands around the titles of the headings. If you want a sub-subsection or smaller part to be unnumbered in your output, simply append an asterisk to the command name. Examples of both numbered and unnumbered headings will appear throughout this sample document.

You can indicate the start of a new paragraph with a blank line in your input file; that is why this sentence forms a separate paragraph.

1.1.1 Type Changes and *Special* Characters

We have already seen several typeface changes in this sample. You can indicate italicized words or phrases in your text with the command `\textit`; emboldening with the command `\textbf` and typewriter-style (for instance, for computer code) with `\texttt`. But remember, you do not have to indicate typestyle changes when such

¹This is a footnote.

changes are part of the *structural* elements of your article; for instance, the heading of this subsection will be in a sans serif² typeface, but that is handled by the document class file. Take care with the use of³ the curly braces in typeface changes; they mark the beginning and end of the text that is to be in the different typeface.

You can use whatever symbols, accented characters, or non-English characters you need anywhere in your document; you can find a complete list of what is available in the *L^AT_EX User's Guide* (Lamport, 1986).

1.1.2 Math Equations

You may want to display math equations in three distinct styles: inline, numbered or non-numbered display. Each of the three are discussed in the next sections. For beginners, this online equation editor may be useful (<https://www.codecogs.com/latex/eqneditor.php>). For looking up special characters, see <http://mirror.ctan.org/info/short-math-guide>).

Inline (In-text) Equations

A formula that appears in the running text is called an inline or in-text formula. It is produced by the **math** environment, which can be invoked with the usual `\begin ... \end` construction or with the short form `$... $`. You can use any of the symbols and structures, from α to ω , available in L^AT_EX (Lamport, 1986); this section will simply show a few examples of in-text equations in context. Notice how this equation: $\lim_{n \rightarrow \infty} x = 0$, set here in in-line math style, looks slightly different when set in display style. (See Section 1.1.2).

Display Equations

A numbered display equation—one set off by vertical space from the text and centered horizontally—is produced by the **equation** environment. An unnumbered display equation is produced by the **displaymath** environment.

Again, in either environment, you can use any of the symbols and structures available in L^AT_EX; this section will just give a couple of examples of display equations in

²Another footnote here. Let's make this a rather long one to see how it looks.

³Another footnote.

Table 1.1: Frequency of Special Characters

Non-English or Math	Frequency	Comments
∅	1 in 1,000	For Swedish names
π	1 in 5	Common in math
\$	4 in 5	Used in business
Ψ ₁ ²	1 in 40,000	Unexplained usage

context. First, consider the equation, shown as an inline equation above:

$$\lim_{n \rightarrow \infty} x = 0 \quad (1.1)$$

Notice how it is formatted somewhat differently in the `displaymath` environment.

Now, we'll enter an unnumbered equation:

$$\sum_{i=0}^{\infty} x + 1$$

and follow it with another numbered equation:

$$\sum_{i=0}^{\infty} x_i = \int_0^{\pi+2} f \quad (1.2)$$

just to demonstrate L^AT_EX's able handling of numbering. You can use labels to make references to equations like Eq. 1.1.

1.1.3 Tables

Because tables cannot be split across pages, the best placement for them is typically the top of the page nearest their initial cite. To ensure this proper “floating” placement of tables, use the environment `table` to enclose the table's contents and the table caption. The contents of the table itself must go in the `tabular` environment, to be aligned properly in rows and columns, with the desired horizontal and vertical rules. Again, detailed instructions on `tabular` material are found in the *L^AT_EX User's Guide*.

Immediately following this sentence is the point at which Table 1.1 is included in the input file; compare the placement of the table here with the table in the printed output of this document.

It is strongly recommended to use the package `booktabs` (Fear, 2005) and follow its main principles of typography with respect to tables:

1. Never, ever use vertical rules.

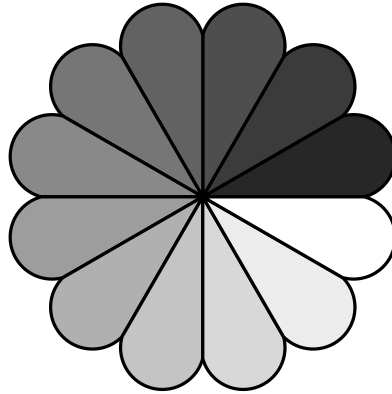


Figure 1.1: A sample graphic that has been resized with the `includegraphics` command.

2. Never use double rules.

It is also a good idea not to overuse horizontal rules.

1.1.4 Figures

Like tables, figures cannot be split across pages; the best placement for them is typically the top or the bottom of the page nearest their initial cite. To ensure this proper “floating” placement of figures, use the environment `figure` to enclose the figure and its caption.

This sample document contains an example of `.pdf` file to be displayable with \LaTeX . You can also use `.png` or `.jpg` files. See Fig. 1.1

1.1.5 Pseudo-code / Algorithms

See <https://en.wikibooks.org/wiki/LaTeX/Algorithms> and Algorithm 1.1.

Algorithm 1.1 Calculate $y = x^n$

Require: $n \geq 0 \vee x \neq 0$ **Ensure:** $y == x^n$ $y = 1$ **if** $n < 0$ **then** $X = 1/x$ $N = -n$ **else** $X = x$ $N = n$ **end if****while** $N \neq 0$ **do****if** N is even **then** $X = X \times X$ $N = N/2$ **else** $\{N$ is odd $\}$ $y = y \times X$ $N = N - 1$ **end if****end while****return true**

Chapter 2

How to handle citations references and bibliography in Latex

Citations to articles (Bowman et al., 1993; Clark, 1991; Braams, 1991; Herlihy, 1993), conference proceedings (Clark, 1991) or maybe books (Lamport, 1986; Salas and Hille, 1978) listed in the Bibliography section of your article will occur throughout the text of your dissertation. You should use BibTeX to automatically produce this bibliography; you simply need to insert one of several citation commands with a key of the item cited in the proper location in the `.tex` file (Lamport, 1986). The key is a short reference you invent to uniquely identify each work; in this sample document, the key is the first author's surname and a word from the title. This identifying key is included with each item in the `.bib` file for your dissertation.

You can use textual citations like in Abril and Plant (2007), using `\citet` or parenthetical citations like (Abril and Plant, 2007), using `\citep`.

More examples. A paginated journal article (Abril and Plant, 2007), an enumerated journal article (Cohen et al., 2007), a monograph (whole book) (Kosiur, 2001), a monograph/whole book in a series (see 2a in spec. document) (Harel, 1979), a divisible-book such as an anthology or compilation (Editor, 2008), a chapter in a divisible book (Spector, 1990), a chapter in a divisible book in a series (Douglass et al., 1998), a multi-volume work as book (Knuth, 1997), an article in a proceedings (of a conference, symposium, workshop for example) (paginated proceedings article) (Ander, 1979), a proceedings article with all possible elements (Smith, 2010), an example of an enumerated proceedings article (Gundy et al., 2007), an informally published

work (Harel, 1978), a doctoral dissertation (Clarkson, 1985), a master's thesis: (Anisi, 2003), online resource (Poker-Edge.Com, 2006), a video game (Case 1) (Obama, 2008) and (Case 2) (Novak, 2003) and (Lee, 2005) and (Case 3) a patent (Scientist, 2009), work accepted for publication (Rous, 2008), 'YYYYb'-test for prolific author (Saeedi, Zamani and Sedighi, 2010) and (Saeedi, Zamani, Sedighi and Sasanian, 2010). Other cites might contain 'duplicate' DOI and URLs (some SIAM articles) (Kirschmer and Voight, 2010). Boris / Barbara Beeton: multi-volume works as books (Hörmander, 1985b) and (Hörmander, 1985a).

Citation with DOI: Kirschmer and Voight (2010).

2.1 An example of a very very long section or chapter title that was not possible to be shorter.

(The shorter version of the title is used in the table of contents)

Chapter 3

Example outline of the thesis

`\chapter{Introduction}`

2-5 pages long introduction giving a concise description of the topic of research, the problem to be tackled, and the way it is going to be solved. (These descriptions should match the sections and content of the thesis).

(This chapter is written last).

`\chapter{Background}`

This chapter contains the literature review.

`\section{Description of the topic of study}`

`\section{Data sets used}`

Information about the data sets used, without considering any major pre-processing of the data.

`\section{Methodology}`

Explain in detail the methods that are going to be used. The explanation should

`\chapter{Analysis A}`

`\section{Data}`

Further information about the data sets, particularly the basic descriptive

`\section{Results of analysis A}`

`\section{Discussion of results and link to Analysis B}`


```
\chapter{Analysis B (if Any)}
```

```
\chapter{Conclusions}
```

```
\bibliography{bibliographyfilename}
```

```
\appendix
```

```
\chapter{Appendix 1}
```

Chapter 4

Conclusions

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Appendix A

This is my first appendix

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