

Mid-Semester Thesis Report:
Submitted in partial fulfillment of the
requirements of BITS 422T Thesis

by

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Abstract

This document provides information on how to write your thesis using the L^AT_EX document preparation system. You can use these files as a template for your own thesis, just replace the content, as necessary. You should put your real abstract here, of course.

“The purpose of the abstract, which should not exceed 150 words for a Masters’ thesis or 350 words for a Doctoral thesis, is to provide sufficient information to allow potential readers to decide on relevance of the thesis. Abstracts listed in Dissertation Abstracts International or Masters’ Abstracts International should contain appropriate key words and phrases designed to assist electronic searches.”

— MUN School of Graduate Studies

Acknowledgements

Put your acknowledgements here...

“Intellectual and practical assistance, advice, encouragement and sources of monetary support should be acknowledged. It is appropriate to acknowledge the prior publication of any material included in the thesis either in this section or in the introductory chapter of the thesis.”

— MUN School of Graduate Studies

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Chapter 1

Introduction

1.1 Getting started

This is the introductory chapter. This will give you some ideas on how to use L^AT_EX [1] to typeset your document. Here is a sample quote using the `\munquote` environment:

“L^AT_EX is a system for typesetting documents. Its first widely available version, mysteriously numbered 2.09, appeared in 1985. L^AT_EX is now extremely popular in the scientific and academic communities, and it is used extensively in industry. It has become a lingua franca of the scientific world; scientists send their papers electronically to colleagues around the world in the form of L^AT_EX input.” [1]

The citation at the end is optional — if you don’t need it, then use `\munquote` without any arguments:

“Here is a quote that does not have an associated citation after it. You can specify the citation before or after the quote manually.”

By default, all text is double spaced, however, quotes and footnotes must be singled spaced.¹ The left margin is slightly wider than the right margin. This is to compensate for binding.

An example mathematical formulae is show in Equation 1.1.

$$\sum_{i=0}^n i^2 \tag{1.1}$$

A slightly more complicated equation is given in Equation 1.2:²

$$i\hbar \frac{\partial}{\partial t} \Psi(x, t) = -\frac{\hbar^2}{2m} \nabla^2 \Psi(x, t) + V(x) \Psi(x, t) \tag{1.2}$$

1.2 Cross References

In addition to using `\ref` to refer to equations, you can also use it (in conjunction with the `\label` command) to refer to sections and chapters without hard coding the numbers themselves. For example, this is Section 1.2 of Chapter 1. You can also refer to Appendix A, Subsection 1.7.1.1 below or any other place that has a `\label`. You can also use labels to refer to a page. For example, Chapter 2 starts on page 7.

¹This is a single spaced footnote. SGS requires that footnotes be singled spaced and this can be done with the `\munfootnote` command.

²Equation taken from the *Schrödinger equation* entry on *Wikipedia*

1.3 Some Suggestions

Here are a few recommendations:

- Before using this template, make sure you check with your supervisor.
- MUN's library provides electronic access to some L^AT_EX related textbooks which can be read online. Use the search term `latex (computer file)` on the Library's web page.
- If you run into a problem, Google may be a helpful resource.
- Concentrate on content, let L^AT_EX handle the typesetting.
- Don't worry about warnings related to:
 - overfull hboxes/boxes
 - underfull hboxes/vboxes

These can be corrected with modest rewording of your text prior to submission of your final copy.

1.4 The Makefile

You can use `make` to “build” your thesis on the Linux command line³ This will automatically run the `bibtex` program to create your bibliography and will also re-run `latex` as necessary to ensure that all references are resolved. A device independent

³Linux is available on all machines running LabNet in *The Commons* and in other computer labs on campus.

file (`thesis.dvi`) will be created, by default. If you are using this template in another environment other than the Linux command line, then the `Makefile` will probably not be useful to you.

- To make a PostScript copy of your thesis, type the following at the command line:

```
make thesis.ps
```

- To generate a PDF copy of your thesis, run:

```
make thesis.pdf
```

- To generate a PDF/A-1b copy of your thesis (which should satisfy the SGS's thesis submission requirements):

```
make ethesis.pdf
```

- To remove all the files generated by `bibtex` and `latex`, use the command:

```
make clean
```

- To remove the intermediate files, but leave the PostScript and DVI/PDF files intact, use the command:

```
make neat
```

As you add or remove figures, chapters, or appendices to your thesis, make sure you keep the `Makefile` upto date, too (see the `FIGURES` and `FILES` macros in the `Makefile`).

1.5 Changing Fonts

Change fonts: Large, verbatim `~@#$$%^&*(){}[]`, SMALL CAPS, *slanted text*, *emphasized text*, typewriter text.

1.6 Accents and Ligatures

Some accents: é è ô ü ç ï í ñ ā ă ǎ

Some ligatures: flæffi

1.7 Some Lists

Here is a nested enumeration:

1. An enumerated list of items.
 - (a) which can
 - (b) nest
 - i. to arbitrary
 - ii. levels
2. More items
3. in the top
4. level list.

Another enumeration:

1. (a) Main 1 part 1

(b) Main 1 part 2

2. (a) Main 2 part 1

(b) Main 2 part 2

1.7.1 Subsection

1.7.1.1 Subsubsection

This section is referred to by Section 1.2.

1.7.1.2 Subsubsection

<Empty subsection>

Chapter 2

Figures and Tables

2.1 Figures

We can include encapsulated PostScriptTM figures (`.eps`) in the document and refer to it using a label. For example, MUN's logo can be seen in Figure 2.1.

Figure 2.1: This is MUN's logo

Figure 2.2 shows a chart of MUN's Fall enrollment from 2005 – 2009.¹ The figure

¹From *Memorial University of Newfoundland — Fact Book 2009*.

Figure 2.2: MUN Fall Enrollment 2005 – 2009

was created using the **Calc** spreadsheet application of the office suite **OpenOffice.org**.² This figure was reduced by 50%.

For larger figures, we can use landscape mode to rotate the page and display the figure using the `\munlepsfig` command, as shown in Figure 2.3. The figure will be the only thing on the page when typeset in landscape mode. (The figure is reduced to 85% of its original size.)

Alternatively, if we just want to rotate the figure, but not the entire page, we can specify an `angle` attribute in the default argument of the `\munepsfig` command. The result is shown in Figure 2.4. If the figure is too large or if there isn't sufficient text, then the figure may appear on its own page.

Note that all three of the enrollment figures are basically the same file, but with different names — on Linux, they are symbolic links to the same file. The filenames

²This office suite can be downloaded at no cost from <http://openoffice.org/>. Unlike other commercial office suites, **OpenOffice.org** may be legally shared with colleagues and fellow students. There are versions for Linux, Microsoft Windows, Mac OS X and Solaris. Also, unlike commercial offerings, **OpenOffice.org** does not require activation using registration keys.

Figure 2.4: MUN Fall Enrollment 2005 – 2009 (rotated)

have to be different because the reference labels need to be unique.

Figure 2.5 shows a Petri net created using the `xfig` program (<http://www.xfig.org/>) which has very good support for \LaTeX . This figure has been reduced to 40% of its original size.

Figure 2.5: A deadlocked Petri net

We can also create figures of text (such as short code snippets) using the `\muntxtfig` command, as show in Figure 2.6.

```
#include <stdio.h>

int main(int argc, char **argv)
{
    printf("Hello world!\n");
    exit(0);
}
```

Figure 2.6: Hello World

2.2 Tables

We can also create tables, as seen by Table 2.1. Note that, as required by SGS guidelines, the caption for a table appears above the table whereas figure captions appear below the figures. Tables and figures can “float” — they may not appear on the page on which they are mentioned. L^AT_EX tries to handle figure and table placement intelligently, but if if you have a lot of them without a reasonable amount of surrounding textual content, the figures and tables can accumulate towards the end of the chapter. Generally speaking, if there is sufficient text explaining the tables and figures or if the tables/figures are relatively small, this may not be a problem. However, if you have a lot of tables or figures, it may be a good idea to put them in an appendix and refer to them as the need arises.

Table 2.2 shows a different table in landscape mode.³ This is useful if your table

³This data was also taken from the *Memorial University of Newfoundland — Fact Book 2009*.

Table 2.1: Fall Semester Enrollment

	Undergraduate			Graduate		
	F/T	P/T	Total	F/T	P/T	Total
2004	13,191	2,223	15,414	1,308	879	2,187
2005	13,184	2,143	15,327	1,375	920	2,295
2006	12,809	2,224	15,033	1,373	899	2,272
2007	12,634	2,155	14,789	1,403	899	2,302
2008	12,269	2,208	14,477	1,410	1,005	2,415
2009	12,382	2,323	14,705	1,567	1,106	2,673

is too wide for the page. Tables are double-spaced by default. To single-space a table, change the `\baselinestretch` before beginning the table environment. Remember to restore it after the environment has ended.

Table 2.2: Masters Degrees Conferred

Degrees	2009		2010
	May	Oct	May
Master of Applied Science	14	2	1
Master of Applied Social Psychology	1	5	1
Master of Applied Statistics	0	0	0
Master of Arts	37	49	2
Master of Business Administration	14	16	2
Master of Education	107	87	12
Master of Employment Relations	8	9	0
Master of Engineering	20	19	2
Master of Environmental Science	3	3	0
Master of Marine Studies	2	0	0
Master of Music	4	1	0
13 Master of Nursing	7	8	1
Master of Oil and Gas Studies	0	0	0
Master of Philosophy	5	4	0
Master of Physical Education	0	2	0
Master of Public Health	0	8	0

Bibliography

- [1] L. Lamport. *LT_EX: A Document Preparation System*. Addison-Wesley Publishing Company, second edition, 1994.

Appendix A

Appendix title

This is Appendix A.

You can have additional appendices too (*e.g.*, `apdxb.tex`, `apdxc.tex`, *etc.*). If you don't need any appendices, delete the appendix related lines from `thesis.tex` and the file names from `Makefile`.