UNIVERSITY OF
NEW BRUNSWICK UNB

Electronic Thesis and Dissertation LaTex Class Guide

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Table of Contents

I. Introduction

This document class `unbthesis.cls` is based on standard LaTex class `report.cls`. Changes have been made as necessary to meet the graduate school thesis requirement (see thesis guideline: http://www.unb.ca/gradschl/guidelines/documents/RegulationsGuidelinesforPreparationT hesesDissertReports2005_000.pdf). Complementary to this class file are the UNB example thesis LaTex files including `UNBThesis.tex, dedication.tex, abstract.tex, acknowledgements.tex, abbreviations.tex, chapter1.tex, chapter2.tex, chapter3.tex, chapter4.tex, chapter5.tex, bibliography.tex, mybibliography.bib, appendices.tex, glossary.tex, vita.tex` . Those files will serve as a starter for writing your own thesis. You are free to add or remove those files or use different LaTex packages to meet your own needs. It is assumed that LaTex software has been installed on your computer and you have a basic knowledge of LaTex. See the appendix for installation instruction.

To download `UNBThesis` LaTex files:
1. Go to template section of UNB ETD web site:
   http://www.unb.ca/gradschl/etd/templates.html
2. Save the file `UNBThesis.zip` to your hard drive and unpack to where your thesis file will be.

II. The Structure of UNB Thesis

```
\documentclass[12pt]{unbthesis}
\usepackage{}
…
\title{}
\author{}
\predegree{}
\degree{}
\gau{}
\supervisor{}
\examboard{}
\externalexam{}
\date{}
\copyrightyear{}
```
preamble

```
\begin{document}
```

`\unbtitlepage`	Title page

`\include{dedication}`
`\include{abstract}`
`\include{acknowledgments}`
`\tableofcontents{}`
`\listoftables{}`
`\listoffigures{}`
`\include{abbreviations}`
	Front matter

`\include{chapter1}`
`\include{chapter2}`
`\include{chapter3}`
…
	Main matter

`%\include{bibliography}`
`\bibliographystyle{}`
`\bibliography{mybibliography}`
`\include{appendices}`
`\include{glossary}`
`\include{vita}`
	Back matter

Body

```
\end{document}
```

III. Class Option and Page Setup

1. Paper Size

`unbthesis.cls` uses standard class report default paper size, US letter paper.

2. Font Size

The default font size is 10 pt. You can change it to 12 pt by traditional LaTex way
`\documentclass[12pt]{unbthesis}`

3. Spacing

The text should be double-spaced (except for quotations of more than one sentence, footnotes, tables and bibliography, all of which may be single-spaced). Package `setspace` is used to change line space and loaded in `unbthesis` class by `\usepackage{setspace}`. You can use `\singlespacing` and `\doublespacing` commands to change line space into single or double in your LaTex thesis file. Comment `\setlength\parindent{0pt}` in the example thesis file will leave spaces at the beginning of paragraph.

4. Margins

There should be a margin of not less than 4 cm (1½ inches) on the left side of each sheet and of not less than 2.5 cm (1 inch) on the top, bottom and right-side margins. You can specify margins in your preamble part of your thesis by using package `geometry`.
`\usepackage[left=4cm, right=2.5cm, top=2.5cm, bottom=2.5cm]{geometry}`.

5. Page Numbering

Small Roman numerals are used for the "preliminary pages" (those preceding the Text) with numbers appearing at the center of the bottom of each page. You can use command like: `\pagenumbering{roman} \setcounter{page}{1}`.

Your introduction should start as page 1 (Arabic numerals). Arabic numerals must be used for all the remainder of the thesis/dissertation/report pages except the vita. The location of page numbers must be consistent throughout the thesis/dissertation/report, including Figures, Illustrations, etc. Use command like: `\pagenumbering{arabic} \setcounter{page}{1}`. Use `\pagestyle{empty} \thispagestyle{empty}` in Vita in order to not show page number.

6. Section and Table of Contents depth

Command `\setcounter{secnumdepth}{3}` will set section depth to 3.
`\setcounter{tocdepth}{3}` will set Table of Contents depth to 3.

IV UNB Title Page

Use `\unbtitlepage` after `\begin{document}`command to start your title page.

1. Paper Title

The paper title is declared like: `\title{Type Title of Thesis here}`. Line break (\\)
may be used to equalize the length of title line.

2. Author

Author is declared like: `\author{John Smith}`.

3. Previous Degree

Your previous degree is declared like: `\predegree{Bachelor of Computer Science, UNB, 2000}`. Use line break (\\) if you have more than one previous degree.
`\predegree{Bachelor of Computer Science, UNB, 2000\\ Bachelor of Arts, UNB, 1999}`.

4. Name of Degree

Declare your degree like: `\degree{Master of Computer Science}`.

5. Your Graduate Academic Units

Declare your graduate academic units like: `\gau{Computer Science}`.

6. Supervisor(s), Examining Board and External Examiner

Supervisor(s), examining board and external examiner are placed in a table format.
Declare supervisor(s) like: `\supervisor{name1,degree department/field}`. Declare
examining board like: `\examboard{name1, degree, department/field, Chair}`.
Declare external examiner like: `\externalexam{name, degree, department/field, institution}`. Use line break (\\) and (&) if you have more than
one of the above mentioned, for example: `\supervisor{name1,degree department/field\\ & name2, degree department/field}`.

7. Date

Declare month, year of submission to Graduate School like: `\date{July, 2005}`.

8. Copyright

Declare your copyright year as year of graduation like: `\copyrightyear{2005}`.

V. Front Matter

1. Dedication

This is optional. `\chapter*{Dedication}` will start a new chapter with title `Dedication` without chapter numbering. `\addcontentsline{toc}{chapter}{Dedication}` command will add chapter title to the table of contents.

2. Abstract

Not more than 350 words for the doctoral degree and not more than 150 words for the Masters degree. Start chapter with
`\chapter*{Abstract}`
`\addcontentsline{toc}{chapter}{Abstract}`.

3. Acknowledgments

This is optional. Start chapter with
`\chapter*{Acknowledgements}`
`\addcontentsline{toc}{chapter}{Acknowledgments}`.

4. Table of Contents

`\renewcommand{\contentsname}{Table of Contents}` will overwrite the contents name. `\tableofcontents{}` will generate a table of contents automatically. `\addcontentsline{toc}{chapter}{Table of Contents}` will add contents name to the table of contents.

5. List of Tables

This is optional. Command `\listoftables{}` will generate a list of table automatically.

6. List of Figures

This is optional. Command `\listoffigures{}` will generate a list of figures automatically.

7. List of Symbols, Nomenclature or Abbreviations

This is optional. Begin chapter with `\chapter*{List of Symbols}`.

VI. Main Matter

1. Chapters

Start each chapter with numbering by using: `\chapter{chapter title}`. The following command will start section and subsections with numbering.

```
\section{ section title}
\subsection{subsection title}
\subsubsection{subsubsection title}
```

2. Footnotes and Citations

Writing footnote by using: `\footnote{notes}`. Using `\cite{citeitem}` to write citations in the text.

3. List

Writing unnumbered list by using:

```
\begin{itemize}
      \item item1
      \item item2
      \item item3
\end{itemize}
```

Writing numbered list by using:

```
\begin{enumerate}
      \item item1
      \item item2
      \item item3
\end{enumerate}
```

4. Tables

Tables are handled in standard LaTex manner. For example:

```
\begin{table}[!h]
\caption{Example Table}
\begin{center}
\begin{tabular}{| l | r | r | r | c |}
      \hline
      Name&Exam1&Exam2&Exam3&Grade\\
      \hline
      John&80&85&70&A \\
      \hline
      Smith&60&70&60&B  \\
      \hline
      Peter&90&85&85&A  \\
      \hline
\end{tabular}
\end{center}
\end{table}
```

This will generate a table with caption at above the table. Each row entry is separated by \\ and each column entry is separated by `&`. `\hline` generate a horizontal line and | generate a vertical line. `l r and c` refer to left aligned, right aligned and centered . The table is automatically numbered by chapter number and table number.

5. Figures

The ideal graphics format for inclusion in a LaTex document is "encapsulated postscript" or eps. There is a free conversion utility called ImageMagick (http://www.imagemagick.org) which can convert image from one format to another. For example: `convert rose.jpg rose.eps`.

Figures are handled in a similar way as tables. The following code generates a figure with caption at the bottom of the figure. The figure is automatically numbered by chapter number and figure number.

```
\begin{figure}[!h]
\begin{center}
\includegraphics{unblogo}
\caption{UNB logo}
\end{center}
\end{figure}
```

6. Verbatim

It is often necessary to display information as entered at the terminal. This ability is provided by the standard LaTex environment `verbatim`. The result will be the same as you typed for the following example.

```
\begin{verbatim}
public class BasicsDemo{
    public static void main(String[] args){
        int sum = 0;
        for (int current = 1; current <= 10; current++){
            sum += current;
        }
        System.out.println("Sum = " + sum);
    }
}
\end{verbatim}
```

7. Program Code

Include package `listings` in the preamble by using `\usepackage{listings}` in order to pretty-print program code in LaTex. The package parser is quite general and can recognize the syntax of many different languages. For example:

```
\begin{lstlisting}[language=Java]
public class BasicsDemo {
    public static void main(String[] args) {
        int sum = 0;
        for (int current = 1; current <= 10; current++) {
```

```
        sum += current;
    }
        System.out.println("Sum = " + sum);
    }
}
\end{lstlisting}
```

8. Typing Math

Mathematical material to be typeset inline must be surrounded by a single dollar sign. For example: `$a^2 + b^2 =c^2$`. Displayed math environments open with `\[` and close with `\]` without equation numbering. For example:

```
\[
    \lim_{x \to a}f(x)
\]
```

`\begin{equation}…\end{equation}` environment will display a math equation with numbering. For example:

```
\begin{equation}
    (a+b)^3 = (a+b)^2(a+b)
\end{equation}
```

`\begin{align}…\end{align}` environment will display multiple line math equation with numbering. For example:

```
\begin{align}
    (a+b)^3 &= (a+b)^2(a+b)\\
    &=(a^2+2ab+b^2)(a+b)\\
    &=(a^3+2a^2b+ab^2) + (a^2b+2ab^2+b^3)\\
    &=a^3+3a^2b+3ab^2+b^3
\end{align}
```

`\begin{matrix}…\end{matrix}` environment will display a matrix. For example:

```
\[
\begin{matrix}
    a+b & uv & x-y & 5\\
    a+b+c & u+v &x+y & 10
\end{matrix}
\]
```

`\begin{cases}…\end{cases}` will display a math cases. For example:

```
\[
f(x)=
\begin{cases}
    -x^{2}, &\text{if $x<0$;}\\
    \alpha+x, &\text{if $0 \leq x \leq 1$;}\\
    x^{2}, &\text{otherwise.}
\end{cases}
\]
```

9. Math theorem, definition, lemma and notation etc.

When writing mathematical theorem, definition, lemma and notation in your document, put `\newtheorem` in the preamble of your document, you can use the `\begin{name}` ...`\end{name}` in your document. For example:

```
%in preamble
\newtheorem{theorem}{Theorem}[section]
\newtheorem{definition}{Definition}[section]

%in the document
\begin{theorem}The lexicographic bottleneck problem can be
solved in polynomial time if and only if LBaOP1 can be solved in
polynomial time.
\end{theorem}

\begin{definition}
This is a definition.
\end{definition}
```

10. Math Proof

`\begin{proof}`...`\end{proof}` environment will display your mathematical proof. For example:

```
\begin{proof}[math proof]
Let the length of every Hamiltonian path in $G$ be $\alpha .$ For
any edge $e=(i,j)\in E(G),$ let $w(e)=c_{ij}.$ Let $H$ be an
arbitrary Hamiltonian cycle in $G$ with
$E(H)=\{e_{1},e_{2},...,e_{n}\}$. For any $i\in \{1,\ldots ,n\},$
$C(H-e_{i})=\alpha .$ Hence $w(e_{i})=\alpha/(n-1)$ for $i=1,\ldots
,n.$  Since $H$ is arbitrary and $G$ is strongly Hamiltonian,
$w(e)=\alpha /(n-1)$ for all $e\in E(G).$
\end{proof}
```

VII. Back Matter

1. Bibliography

The command `\renewcommand{\bibname}{References}` will change default name Bibliography to References.

A. Producing a bibliography with thebibliography environment

The simplest way to add a bibliography in LaTex is to use `thebibliography` environment. Each entry starts with `\bibitem`. For example:

```
\begin{thebibliography}{99}
\addcontentsline{toc}{chapter}{Bibliography}
\bibitem{ConcreteMath}
R.L. Graham, D.E. Knuth, and O. Patashnik, \emph{Concrete
mathematics}, Addison-Wesley, Reading, MA, 1989.

\bibitem{Knuth92} D.E. Knuth, \emph{Two notes on notation}, Amer.
Math. Monthly \textbf{99} (1992), 403--422.
\end{thebibliography}
```

99 represent the width of the widest label. The above example yields the following result.

Bibliography

[1] D.E. Knuth, *Two notes on notation*, Amer. Math. Monthly 99 (1992), 403-422.

[2] R.L. Graham, D.E. Knuth, and O. Patashnik, *Concrete mathematics*, Addison-Wesley, Reading, MA, 1989.

You can make references in the text to a bibliography item using `\cite{}`. For example: `Here is a citation\cite{Knuth92}.` Where `Knuth92` matches the key for the corresponding bibliography entry `\bibitem{Knuth92}`.

B. Generating a bibliography with BibTex

There are three steps to use BibTex to generate a bibliography.
Step 1: create a database (`.bib`) file. For example, save the following example as `mybibliography.bib`.

```
@article{Knuth92,
        author = "D.E. Knuth",
        title = "Two notes on notation",
        journal = "Amer. Math. Monthly",
        volume = "99",
        year = "1992",
        pages = "403--422",
```

```
}

@book{ConcreteMath,
        author = "R.L. Graham and D.E. Knuth and O. Patashnik",
        title = "Concrete mathematics",
        publisher = "Addison-Wesley",
        address = "Reading, MA",
        year = "1989"
}
```

Step 2: specify the style and location of the bibliography in your LaTex document. For example, insert the following command after your main body text.

```
\bibliographystyle{amsplain}
\bibliography{mybibliography}
```

Step 3: process paper through multiple runs of latex and bibtex. Execute the following commands in sequence:

```
1. latex UNBThesis
2. bibtex UNBThesis
3. latex UNBThesis
4. latex UNBThesis
```

2. Appendices, Glossary

Appendix numbering usually use alphabet like Appendix A, B, C. the command \appendix will start an appendix environment. For example:

```
\appendix
\chapter{this is Appendix A}
\section{this is section}
start writing text here.
```

If you have more than one appendix, start a new chapter by using \chapter{}.

3. Vita

The format for vita is as following, just fill in the required information. If your vita has only one page, comment command \pagestyle{empty}.

```
\chapter*{Vita}
\pagestyle{empty}
\thispagestyle{empty}
\addcontentsline{toc}{chapter}{Vita}
Candidate's full name:\\
University attended (with dates and degrees obtained):\\
Publications:\\
Conference Presentations:
```

Appendix: Software Installation

1. LaTex software

MikTex is an up-to-date implementation of Tex and related programs for windows. Go to http://www.miktex.org/ for installation details. The command to compile latex source file is: `latex UNBThesis.` You may need to compile latex file a few times in order to get correct table of contents. The command to view a DVI file is: `yap UNBThesis.` The command to get a PDF file `pdflatex UNBThesis,` you will get a `UNBThesis.pdf` file.

WinEdt (shareware) is a powerful and versatile ASCII editor and shell for MS Windows with a strong predisposition towards the creation of [La]Tex documents. Go to http://www.winedt.com/ for installation details. By default WinEdt's Menu is configured to run as a front end for MikTex. Click on LaTex menu to compile a LaTex source file, click on DVI to view a DVI file, click on dvipdf menu to generate a pdf file.

2. Graphics Conversion Program

ImageMagick is a free graphics conversion utility. Go to http://www.imagemagick.org/ for installation details. The command to convert an image in one format to another is: `convert rose.jpg rose.eps.`

Reference

[1] F. Mittelbach, M. Goossens, *The LaTex Companion,* Addison-Wesley, MA, 2004.

[2] T. Oetiker, H. Partl, I. Hyna, E. Schlegl, *The Not So Short Introduction to LaTex2ε,* http://www.ctan.org/tex-archive/info/lshort/english/lshort.pdf, 2005

[3] G. Gratzer, *Math into LaTex: an introduction to LaTex and AMS-LaTex,* Library of Congress, Boston, 1996. The first chapter is available online at http://www.ctan.org/tex-archive/info/mil/mil.pdf.

[4] K. Reckdahl, *Using Imported Graphics in LaTex2ε,* http://www.ctan.org/tex-archive/info/epslatex.pdf, 1997.

[5] G. Gonzato, *LaTex for Word Processor Users*, http://www.ctan.org/tex-archive/info/latex4wp/latex4wp.pdf, 2003.

[6] http://www.maths.ox.ac.uk/help/faqs/latex/

[7] http://www.math.harvard.edu/texman/

[8] http://www.math.uiuc.edu/~hildebr/tex/

[9] http://www.ieee.org/portal/pages/pubs/transactions/stylesheets.html