#### On the Use of the ubcdiss Template

by

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#### On the Use of the ubcdiss Template

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## Glossary

This glossary uses the handy acroynym package to automatically maintain the glossary. It uses the package's printonlyused option to include only those acronyms explicitly referenced in the LATEX source. To change how the acronyms are rendered, change the \acsfort definition in diss.tex.

CTAN	The Common T <sub>E</sub> X Archive Network
DOI	Document Object Identifier (see http://doi.org)
GPS	Graduate and Postdoctoral Studies
RCS	Revision control system, a software tool for tracking changes to a set of files
URL	Unique Resource Locator, used to describe a means for obtaining some resource on the world wide web

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Don't forget your parents or loved ones.

You may wish to acknowledge your funding sources.

### **Chapter 1**

### Introduction

If I have seen farther it is by standing on the shoulders of Giants.

— Sir Isaac Newton (1855)

This document provides a quick set of instructions for using the ubcdiss class to write a dissertation in LaTeX. Unfortunately this document cannot provide an introduction to using LaTeX. The classic reference for learning LaTeX is Lamport's book [3]. There are also many freely-available tutorials online; Andy Roberts' online LaTeX tutorials seems to be excellent. The source code for this document, however, is intended to serve as an example for creating a LaTeX version of your dissertation.

We start by discussing organizational issues, such as splitting your dissertation into multiple files, in Section 1.1. We then cover the ease of managing cross-references in LaTeX in Section 1.2. We cover managing and using bibliographies with BibTeX in Section 1.3. We briefly describe typesetting attractive tables in Section 1.4. We briefly describe including external figures in Section 1.5, and using special characters and symbols in Section 1.6. As it is often useful to track different versions of your dissertation, we discuss revision control further in Section 1.8. We conclude with pointers to additional sources of information in Section 1.10.

<sup>&</sup>lt;sup>1</sup>http://www.andy-roberts.net/misc/latex/

#### 1.1 Suggested Thesis Organization

The UBC Graduate and Postdoctoral Studies (GPS) specifies a particular arrangement of the components forming a thesis.<sup>2</sup> This template reflects that arrangement.

In terms of writing your thesis, the recommended best practice for organizing large documents in LATEX is to place each chapter in a separate file. These chapters are then included from the main file through the use of \include{file}. A thesis might be described as six files such as intro.tex, relwork.tex, model.tex, eval.tex, discuss.tex, and concl.tex.

We also encourage you to use macros for separating how something will be typeset (e.g., bold, or italics) from the meaning of that something. For example, if you look at intro.tex, you will see repeated uses of a macro  $\file\{\}$  to indicate file names. The  $\file\{\}$  macro is defined in the file macros.tex. The consistent use of  $\file\{\}$  throughout the text not only indicates that the argument to the macro represents a file (providing meaning or semantics), but also allows easily changing how file names are typeset simply by changing the definition of the  $\file\{\}$  macro. macros.tex contains other useful macros for properly typesetting things like the proper uses of the latinate exempli gratiā and id est (i.e.,  $\ensuremath{\mbox{eg}}$  and  $\ensuremath{\mbox{ie}}$ ), web references with a footnoted URL ( $\mbox{webref{url}}$  {text}), as well as definitions specific to this documentation ( $\alpha$  expackage {}).

#### 1.2 Making Cross-References

LATEX make managing cross-references easy, and the hyperref package's \autoref{} command<sup>3</sup> makes it easier still.

A thing to be cross-referenced, such as a section, figure, or equation, is *labelled* using a unique, user-provided identifier, defined using the \label{} command. The thing is referenced elsewhere using the \autoref{} command. For example, this section was defined using:

```
\section{Making Cross-References} \label{sec:CrossReferences}
```

<sup>&</sup>lt;sup>2</sup>See http://www.grad.ubc.ca/current-students/dissertation-thesis-preparation/order-components

<sup>&</sup>lt;sup>3</sup>The hyperref package is included by default in this template.

References to this section are made as follows:

```
We then cover the ease of managing cross-references in \LaTeX\ in \autoref\{sec:CrossReferences\}.
```

\autoref{} takes care of determining the *type* of the thing being referenced, so the example above is rendered as

We then cover the ease of managing cross-references in LATEX in Section 1.2.

The label is any simple sequence of characters, numbers, digits, and some punctuation marks such as ":" and "-"; there should be no spaces. Try to use a consistent key format: this simplifies remembering how to make references. This document uses a prefix to indicate the type of the thing being referenced, such as sec for sections, fig for figures, tbl for tables, and eqn for equations.

For details on defining the text used to describe the type of *thing*, search diss.tex and the hyperref documentation for autorefname.

#### 1.3 Managing Bibliographies with BibT<sub>E</sub>X

One of the primary benefits of using LATEX is its companion program, BibTEX, for managing bibliographies and citations. Managing bibliographies has three parts: (i) describing references, (ii) citing references, and (iii) formatting cited references.

#### 1.3.1 Describing References

BibTeX defines a standard format for recording details about a reference. These references are recorded in a file with a .bib extension. BibTeX supports a broad range of references, such as books, articles, items in a conference proceedings, chapters, technical reports, manuals, dissertations, and unpublished manuscripts. A reference may include attributes such as the authors, the title, the page numbers, the Document Object Identifier (DOI), or a Unique Resource Locator (URL). A reference can also be augmented with personal attributes, such as a rating, notes, or keywords.

Each reference must be described by a unique key.<sup>4</sup> A key is a simple sequence

<sup>&</sup>lt;sup>4</sup>Note that the citation keys are different from the reference identifiers as described in Section 1.2.

of characters, numbers, digits, and some punctuation marks such as ":" and "-"; there should be no spaces. A consistent key format simiplifies remembering how to make references. For example:

where *last-name* represents the last name for the first author, and *contracted-title* is some meaningful contraction of the title. Then Kiczales et al.'s seminal article on aspect-oriented programming [2] (published in 1997) might be given the key kiczales-1997-aop.

An example of a BibTeX .bib file is included as biblio.bib. A description of the format a .bib file is beyond the scope of this document. We instead encourage you to use one of the several reference managers that support the BibTeX format such as JabRef<sup>5</sup> (multiple platforms) or BibDesk<sup>6</sup> (MacOS X only). These front ends are similar to reference managers such as EndNote or RefWorks.

#### 1.3.2 Citing References

Having described some references, we then need to cite them. We do this using a form of the \cite command. For example:

```
\citet{kiczales-1997-aop} present examples of crosscutting from programs written in several languages.
```

When processed, the \citet will cause the paper's authors and a standardized reference to the paper to be inserted in the document, and will also include a formatted citation for the paper in the bibliography. For example:

Kiczales et al. [2] present examples of crosscutting from programs written in several languages.

There are several forms of the \cite command (provided by the natbib package), as demonstrated in Table 1.1. Note that the form of the citation (numeric or author-year) depends on the bibliography style (described in the next section). The \citet variant is used when the author names form an object in the sentence,

<sup>&</sup>lt;sup>5</sup>http://jabref.sourceforge.net

<sup>&</sup>lt;sup>6</sup>http://bibdesk.sourceforge.net

**Table 1.1:** Available cite variants; the exact citation style depends on whether the bibliography style is numeric or author-year.

Variant	Result
\cite	Parenthetical citation (e.g., "[2]" or "(Kiczales et al.
	1997)")
\citet	Textual citation: includes author (e.g., "Kiczales et al.
	[2]" or or "Kiczales et al. (1997)")
\citet*	Textual citation with unabbreviated author list
\citealt	Like \citet but without parentheses
\citep	Parenthetical citation (e.g., "[2]" or "(Kiczales et al.
	1997)")
\citep*	Parenthetical citation with unabbreviated author list
\citealp	Like \citep but without parentheses
\citeauthor	Author only (e.g., "Kiczales et al.")
\citeauthor*	Unabbreviated authors list (e.g., "Kiczales, Lamping,
	Mendhekar, Maeda, Lopes, Loingtier, and Irwin")
\citeyear	Year of citation (e.g., "1997")

whereas the \citep variant is used for parenthetic references, more like an endnote. Use \nocite to include a citation in the bibliography but without an actual reference.

#### **1.3.3** Formatting Cited References

BibTeX separates the citing of a reference from how the cited reference is formatted for a bibliography, specified with the \bibliographystyle command. There are many varieties, such as plainnat, abbrvnat, unsrtnat, and vancouver. This document was formatted with abbrvnat. Look through your TeX distribution for .bst files. Note that use of some .bst files do not emit all the information necessary to properly use \citet{}, \citep{}, \citeyear{}, and \citeauthor{}.

There are also packages available to place citations on a per-chapter basis (bibunits), as footnotes (footbib), and inline (bibentry). Those who wish to exert maximum control over their bibliography style should see the amazing custom-bib package.

#### 1.4 Typesetting Tables

Lamport [3] made one grievous mistake in LATEX: his suggested manner for type-setting tables produces typographic abominations. These suggestions have unfortunately been replicated in most LATEX tutorials. These abominations are easily avoided simply by ignoring his examples illustrating the use of horizontal and vertical rules (specifically the use of hline and |) and using the booktabs package instead.

The booktabs package helps produce tables in the form used by most professionally-edited journals through the use of three new types of dividing lines, or *rules*. Tables 1.1 and 1.2 are two examples of tables typeset with the booktabs package. The booktabs package provides three new commands for producing rules: \toprule for the rule to appear at the top of the table, \midrule for the middle rule following the table header, and \bottomrule for the bottom-most at the end of the table. These rules differ by their weight (thickness) and the spacing before and after. A table is typeset in the following manner:

```
\begin{table}
\caption{The caption for the table}
\label{tbl:label}
\centering
\begin{tabular}{cc}
\toprule
Header & Elements \\
\midrule
Row 1 & Row 1 \\
Row 2 & Row 2 \\
% ... and on and on ...
Row N & Row N \\
\bottomrule
\end{tabular}
\end{tabular}
\end{table}
```

See the booktabs documentation for advice in dealing with special cases, such as subheading rules, introducing extra space for divisions, and interior rules.

#### 1.5 Figures, Graphics, and Special Characters

Most LATEX beginners find figures to be one of the more challenging topics. In LATEX, a figure is a *floating element*, to be placed where it best fits. The user is not

### LATEX Rocks!

Figure 1.1: Proof of LATEX's amazing abilities

expected to concern him/herself with the placement of the figure. The figure should instead be labelled, and where the figure is used, the text should use \autoref to reference the figure's label. Figure 1.1 is an example of a figure. A figure is generally included as follows:

```
\begin{figure}
\centering
\includegraphics[width=3in]{file}
\caption{A useful caption}
\label{fig:fig-label} % label should change
\end{figure}
```

#### There are three items of note:

- 1. External files are included using the \includegraphics command. This command is defined by the graphicx package and can often natively import graphics from a variety of formats. The set of formats supported depends on your TeX command processor. Both pdflatex and xelatex, for example, can import GIF, JPG, and PDF. The plain version of latex only supports EPS files.
- 2. The \caption provides a caption to the figure. This caption is normally listed in the List of Figures; you can provide an alternative caption for the LoF by providing an optional argument to the \caption like so:

```
\caption[nice shortened caption for LoF]{% longer detailed caption used for the figure}
```

GPS generally prefers shortened single-line captions in the LoF: multiple-line captions are a bit unwieldy.

3. The \label command provides for associating a unique, user-defined, and descriptive identifier to the figure. The figure can be can be referenced elsewhere in the text with this identifier as described in Section 1.2.

Table 1.2: Useful LATEX symbols

LATEX	Result	IATEX	Result
\texttrademark	TM	\&	&
\textcopyright	©	\{ \}	{}
\textregistered	R	\%	%
\textsection	§	\verb!~!	~
\textdagger	†	\\$	\$
\textdaggerdbl	#	\^{}	^
\textless	<	\_	_
\textgreater	>		

See Keith Reckdahl's excellent guide for more details, *Using imported graphics in LaTeX2e*<sup>7</sup>.

#### 1.6 Special Characters and Symbols

#### 1.7 Changing Page Widths and Heights

The ubcdiss class is based on the standard LATEX book class [3] that selects a line-width to carry approximately 66 characters per line. This character density is claimed to have a pleasing appearance and also supports more rapid reading [1]. I would recommend that you not change the line-widths!

<sup>&</sup>lt;sup>7</sup>http://www.ctan.org/tex-archive/info/epslatex.pdf

#### 1.7.1 The geometry Package

Some students are unfortunately saddled with misguided supervisors or committee members whom believe that documents should have the narrowest margins possible. The geometry package is helpful in such cases. Using this package is as simple as:

```
\usepackage[margin=1.25in,top=1.25in,bottom=1.25in]{geometry}
```

You should check the package's documentation for more complex uses.

#### 1.7.2 Changing Page Layout Values By Hand

There are some miserable students with requirements for page layouts that vary throughout the document. Unfortunately the <code>geometry</code> can only be specified once, in the document's preamble. Such miserable students must set LATEX's layout parameters by hand:

```
\setlength \\topmargin\{-.75in\}
\setlength \\headsep\{0.25in\}
\setlength \\headheight\{15pt\}
\setlength \\\footskip\{0.25in\}
\setlength \\\footskip\{0.25in\}
\setlength \\\footheight\{15pt\}

% The *sidemargin values are relative to 1in; so the following % results in a 0.75 inch margin
\setlength \\\oddsidemargin\{-0.25in\}
\setlength \\\evensidemargin\{-0.25in\}
\setlength\{\textwidth\{7in\} % 1.1in margins (8.5-2*0.75)
```

These settings necessarily require assuming a particular page height and width; in the above, the setting for \textwidth assumes a US Letter with an 8.5" width. The geometry package simply uses the page height and other specified values to derive the other layout values. The layout package provides a handy \layout command to show the current page layout parameters.

#### 1.7.3 Making Temporary Changes to Page Layout

There are occasions where it becomes necessary to make temporary changes to the page width, such as to accommodate a larger formula. The change package provides an adjustwidth environment that does just this. For example:

```
% Expand left and right margins by 0.75in \begin{adjustwidth}{-0.75in}{-0.75in} % Must adjust the perceived column width for LaTeX to get with it. \addtolength{\columnwidth}{1.5in} \[ an extra long math formula \] \end{adjustwidth}
```

#### 1.8 Keeping Track of Versions with Revision Control

Software engineers have used Revision control system (RCS) to track changes to their software systems for decades. These systems record the changes to the source code along with context as to why the change was required. These systems also support examining and reverting to particular revisions from their system's past.

An RCS can be used to keep track of changes to things other than source code, such as your dissertation. For example, it can be useful to know exactly which revision of your dissertation was sent to a particular committee member. Or to recover an accidentally deleted file, or a badly modified image. With a revision control system, you can tag or annotate the revision of your dissertation that was sent to your committee, or when you incorporated changes from your supervisor.

Unfortunately current revision control packages are not yet targetted to non-developers. But the Subversion project's TortoiseSVN<sup>8</sup> has greatly simplified using the Subversion revision control system for Windows users. You should consult your local geek.

A simpler alternative strategy is to create a GoogleMail account and periodically mail yourself zipped copies of your dissertation.

#### 1.9 Recommended Packages

The real strength to LATEX is found in the myriad of free add-on packages available for handling special formatting requirements. In this section we list some helpful packages.

#### 1.9.1 Typesetting

**enumitem:** Supports pausing and resuming enumerate environments.

<sup>&</sup>lt;sup>8</sup>http://tortoisesvn.net/docs/release/TortoiseSVN\_en/

```
\usepackage[normalem,normalbf]{ulem}
```

to prevent the package from redefining the emphasis and bold fonts.

**chngpage:** Support changing the page widths on demand.

**mhchem:** Support for typesetting chemical formulae and reaction equations.

Although not a package, the latexdiff<sup>9</sup> command is very useful for creating changebar'd versions of your dissertation.

#### 1.9.2 Figures, Tables, and Document Extracts

**pdfpages:** Insert pages from other PDF files. Allows referencing the extracted pages in the list of figures, adding labels to reference the page from elsewhere, and add borders to the pages.

**subfig:** Provides for including subfigures within a figure, and includes being able to separately reference the subfigures. This is a replacement for the older subfigure environment.

**rotating:** Provides two environments, sidewaystable and sidewaysfigure, for typesetting tables and figures in landscape mode.

**longtable:** Support for long tables that span multiple pages.

**tabularx:** Provides an enhanced tabular environment with auto-sizing columns.

**ragged2e:** Provides several new commands for setting ragged text (e.g., forms of centered or flushed text) that can be used in tabular environments and that support hyphenation.

<sup>&</sup>lt;sup>9</sup>http://www.ctan.org/tex-archive/support/latexdiff/

#### 1.9.3 Bibliography Related Packages

```
bibunits: Support having per-chapter bibliographies.
```

**footbib:** Cause cited works to be rendered using footnotes.

**bibentry:** Support placing the details of a cited work in-line.

**custom-bib:** Generate a custom style for your bibliography.

#### 1.10 Moving On

At this point, you should be ready to go. Other handy web resources:

- Common TeX Archive Network (CTAN)<sup>10</sup> is *the* comprehensive archive site for all things related to TeX and LaTeX. Should you have some particular requirement, somebody else is almost certainly to have had the same requirement before you, and the solution will be found on CTAN. The links to various packages in this document are all to CTAN.
- An online reference to LATEX commands<sup>11</sup> provides a handy quick-reference to the standard LATEX commands.
- The list of Frequently Asked Questions about TEX and LATEX 12 can save you a huge amount of time in finding solutions to common problems.
- The teTeX documentation guide<sup>13</sup> features a very handy list of the most useful packages for LATeX as found in CTAN.
- The color<sup>14</sup> package, part of the graphics bundle, provides handy commands for changing text and background colours. Simply changing text to various levels of grey can have a very dramatic effect.
- If you're really keen, you might want to join the TeX Users Group 15.

<sup>10</sup> http://www.ctan.org

<sup>11</sup> http://www.ctan.org/get/info/latex2e-help-texinfo/latex2e.html

<sup>12</sup>http://www.tex.ac.uk/cgi-bin/texfaq2html?label=interruptlist

<sup>&</sup>lt;sup>13</sup>http://www.tug.org/tetex/tetex-texmfdist/doc/

<sup>&</sup>lt;sup>14</sup>http://www.ctan.org/tex-archive/macros/latex/required/graphics/grfguide.pdf

<sup>&</sup>lt;sup>15</sup>http://www.tug.org

### **Bibliography**

- [1] R. Bringhurst. *The Elements of Typographic Style*. Hartley & Marks, 2.5 edition, 2002. ISBN 0881791326.  $\rightarrow$  page 8
- [2] G. Kiczales, J. Lamping, A. Mendhekar, C. Maeda, C. Lopes, J.-M. Loingtier, and J. Irwin. Aspect-oriented programming. In *Proceedings of the European Conference on Object-Oriented Programming (ECOOP)*, volume 2591 of *Lecture Notes in Computer Science*, pages 220–242, 1997. → pages 4, 5
- [3] L. Lamport. LamberTEX: A Document Preparation System. Addison-Wesley, 2 edition, 1994. ISBN 0201529831.  $\rightarrow$  pages 1, 6, 8
- [4] J. K. Rowling. *Harry Potter and the Philospher's Stone*. Bloomsbury, 1997. ISBN 0747532699.

### Appendix A

## **Supporting Materials**

This would be any supporting material not central to the dissertation. For example:

- additional details of methodology and/or data;
- diagrams of specialized equipment developed.;
- copies of questionnaires and survey instruments.