

The fsuthesis L^AT_EX Class: A User's Guide

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1 Introduction to L^AT_EX

If you are already a T_EX/L^AT_EX convert, you may skip over this introductory material and jump ahead to the description of the fsuthesis class macros in section 5. If you're new to L^AT_EX, you may want to learn a little bit more about what you may be getting yourself into first.

If you have grown up only learning to use the word-processing tools that are installed on a typical PC, L^AT_EX may feel awkward initially. However, L^AT_EX's ability to generate cross-references, lists of tables and figures, and a table of contents—automatically—is already worth the small amount of effort required to get started with this very powerful typesetting system. Further, if your document contains mathematics, you'll be hard-pressed to find better software for making your equations look good in type.

Historically, L^AT_EX is not a WYSIWYG¹ system. Instead, documents are created using any available plain text editor. Your document will contain “markup” commands that identify things like chapter titles, section headings, citations, quotations, enumerated lists, etc. When ready, the document is run through L^AT_EX to produce viewable or printable output. This two-step process may be different from what you're used to, but one advantage is that it allows authors to focus more on the content of their documents, and to focus less on the formatting (or at least to defer the attention to formatting until the final stages of document preparation).

2 Installation

2.1 The Basic L^AT_EX System

The L^AT_EX system (and the T_EX engine upon which it is built) will take just a little effort and download time to get installed and running. It is completely free software with a large and committed group of users, and there are lots of resources for helping you to get started. These are much more comprehensive than this *User's Guide* can be.

If you are working in a Microsoft Windows environment, take a look at the MiK_T_EX project (see <http://miktex.org>). Mac users will find the Mac_T_EX resources useful (see <http://www.tug.org/mactex>). Linux/UNIX users should investigate the T_EX Live, if T_EX is not already a part of your installation (see <http://www.tug.org/texlive>).

2.2 Editors and IDEs

In addition to the T_EX/L^AT_EX system, you will need a plain text editor. Both of the recommended packages for Windows and Mac provide an editor suitable for editing your document. Linux/UNIX enthusiasts will probably already have access to and familiarity with emacs or vim (both of which have also been ported to Windows and Mac environments).

There are more advanced document editors for L^AT_EX which include document previews or WYSIWYG functionality. One such option for Windows users is T_EXnicCenter, available from

¹pronounced “wizzywig”: What You See Is What You Get

<http://texniccenter.org/>. This application provides a complete editing and previewing environment for creating \LaTeX documents, including drop-down menus for common \LaTeX commands. The application Texmaker (see <http://www.xmlmath.net/texmaker>) provides an integrated development environment for all three major operating system platforms.

Another popular option is the LyX document processor (see <http://www.lyx.org>). However, in order to use the features provided by the fsuthesis class, you will need to create a custom layout for LyX that corresponds to fsuthesis. Unfortunately, this is not trivial. If you wish to use LyX, you could try creating your document using the standard \LaTeX report class layout within LyX, export the document to \LaTeX , and then do the final editing using the standard tools.

2.3 Installing the fsuthesis Class File

The fsuthesis class is distributed as a zip file. When the zip file is unpacked, a folder called fsuthesis is created. Inside that folder will be found this *User's Guide* (in both its PDF and \LaTeX source form), the thesis-template folder, a sample folder, and supporting files. The fsuthesis class file is called fsuthesis.cls.

You may use the folder thesis-template as a starting point for your document: the fsuthesis.cls file is already unpacked there and ready to go. You can copy the template folder to a new location and build your document within as a self-contained entity. No further installation is necessary.

If you are already a \LaTeX enthusiast, you may make customizations to the fsuthesis class yourself. To do this, you will probably want to take a look at the documented version of the fsuthesis class definitions found in the fsuthesis.dtx source file in the main directory. Processing this file with \LaTeX , you'll create a nicely-formatted and indexed version to read:

```
pdflatex fsuthesis.dtx
makeindex -s gglo.ist -o fsuthesis.gls fsuthesis.glo
makeindex -s gind.ist -o fsuthesis.ind fsuthesis.idx
pdflatex fsuthesis.dtx
```

Be sure to document your changes, and only edit the fsuthesis.dtx file. If you make changes to the fsuthesis.cls file, they may be overwritten later if the class file is re-extracted.

To extract a new class file from the altered source, run the following command:

```
latex fsuthesis.ins
```

To make the class available system-wide, copy the fsuthesis.cls file into the \LaTeX file search tree. (The proper location is operating system and installation-dependent. For UNIX/Linux systems, this location might be something like /usr/share/texmf-site/tex/latex/fsuthesis/.) Otherwise, for local use only, copy the new fsuthesis.cls file to the folder where your thesis or dissertation document resides.

3 Helpful L^AT_EX References

For simple texts, you might not need more from L^AT_EX than what's described in this *User's Guide*. For more complicated texts, however, or for documents containing several tables, figures, or mathematics, you will certainly want to supplement your L^AT_EX references. You will find a wealth of information on-line using your favorite web search engine, as well as several bound and printed reference materials. I have found the texts cited below to be of particular value.

- For first-timers, *The Not So Short Introduction to L^AT_EX 2_ε* by Tobias Oetiker, Hubert Partl, Irene Hyna, and Elisabeth Schlegl promises to have you off and running in a few hours' time. It's a document you may find readily on-line in PDF form.
- The standard reference is the book *L^AT_EX: A Document Preparation System*, 2nd Ed., by Leslie Lamport, the original author of L^AT_EX. This text covers all the basics clearly and succinctly.
- A larger starting reference book is *Guide to L^AT_EX*, 4th Ed., by Helmut Kopka and Patrick W. Daly. At twice the length of the Lamport book, *Guide* covers all the basics, and it also touches on a few of the more common add-on packages. The book comes with a CD-ROM with the T_EX Live distribution included, which can save you a lot of downloading time.
- Once your working knowledge of L^AT_EX is secure, *The L^AT_EX Companion*, 2nd Ed., by Frank Mittelbach and Michel Goossens covers a broad range of topics and L^AT_EX add-on packages. This text goes far beyond the basics, but it's an indispensable reference if you're interested in customizing the appearance of L^AT_EX documents.

4 Working with L^AT_EX

Files you create for processing by L^AT_EX should have file extensions of `.tex`, for example, `mythesis.tex`. For your own convenience, you may split the document into pieces (perhaps one file per chapter), which may make the editing process a little easier by keeping manageable the amount of text you must scroll through at any one time.

While you're typing your document, you will insert macro commands that mark up elements of your document, indicating chapter and section headings, equations, tables, figures, etc. Markup languages attempt to separate the content of the document from its appearance. As an author, you need not be quite as concerned about how everything looks, just what it says. By marking up your document appropriately, you can let L^AT_EX worry about how everything looks.

4.1 Paragraphs and Space

Typing your manuscript for processing by L^AT_EX is not hard, but there are a few rules you should know. To end a paragraph and begin a new one, simply leave a blank line between

them. No matter how many blank lines you leave between paragraphs, it's the same as typing a single blank line: all the extra space is ignored. Likewise, a 100 taps of the space bar has the same result as a single space.

Don't worry about where the end-of-line occurs as you're typing: \LaTeX will reformat the paragraph for you. \LaTeX will also insert paragraph indentations, so there's no need to type tabs or spaces (and they'll be ignored anyway).

The `fsuthesis` class has defined most of the document spacing for you, so you generally don't need to worry about it. If you have particular spacing needs, look into the references in section 3 for more information. Here's an example of how \LaTeX processes what you type into paragraphs:

Typed as ...

I am typing a silly
paragraph to see how it will
turn out.

And here is the next
paragraph.

Displayed as ...

I am typing a silly paragraph
to see how it will turn out.

And here is the next para-
graph.

4.2 Special Characters

Certain keyboard characters have special significance to \LaTeX , and you must be aware of how they are used as you're preparing your document. The ten special characters are:

`# $ % & _ { } ^ ~ \`

If you want to use these characters in your text, you cannot enter them in your manuscript as is: they need extra attention. The first seven may be simply prefixed with the backslash character, and the last three require a small bit of additional syntax. Here's how you would type the characters in your document to have them printed:

`\# \$ \% \& _ \{ \} \^{} \~{} \textbackslash`

which, after processing, results in: `# $ % & _ { } ^ ~ \`

4.3 Dashes and Quotes

Since \LaTeX is a high-quality typesetting system, we are given additional choices in preparing our document for output. For example, there are four distinct dash-type characters available to us, and we should choose the correct dash for the circumstance:

<i>Dash Type</i>	<i>Typed as ...</i>	<i>Displayed as ...</i>
hyphen	anti-theoretical	anti-theoretical
N-dash	pages 23--45	pages 23–45
M-dash	Wait---I'm thinking	Wait—I'm thinking
minus	$x-y=z$	$x - y = z$

You should also be aware of single- and double-quote characters: in well-printed documents, the lefthand-side quotes are shaped differently than righthand-side quotes. The \LaTeX -aware editors that come with the distributions usually handle this for you automatically when you type the double-quote character (") on your keyboard, translating it into the appropriate pair of characters.

Single quotes don't usually get the same automatic treatment, and you should type the individual characters yourself. The left-side "backward" single quote character is usually found beneath the tilde ("squiggle") on your keyboard. The right-side single quote character (apostrophe) is usually found underneath the double-quote character. Sometimes it may be necessary to add a small amount of space between sets of quotes using the `\,` command (as in the last example below), but this is a more subtle typographic nicety.

<i>Typed as ...</i>	<i>Displayed as ...</i>
This 'word' is single-quoted	This ‘word’ is single-quoted
‘‘These words’’ are double-quoted	“These words” are double-quoted
‘\, ‘I’ am, I think’	“ ‘I am, I think”

4.4 Macros, Comments, and Ties

\LaTeX macros begin with a `\` (backslash) special character, followed by the command name. Depending on the command, macros will often require one or more arguments, and some will accept additional optional arguments. The template for such \LaTeX commands is:

```
\commandname[option1,option2]{Required Argument}
```

The optional arguments are included in square brackets (e.g., [*option*]) immediately following the macro invocation. Required arguments follow the optional arguments (if any) between curly braces (e.g., {*This is a required argument*}). The letter case of the macro is important: you must spell commands exactly as they are presented, or \LaTeX will complain about unrecognized commands when your document is processed.

The function of the percent sign (%) special character is to introduce a document comment, which runs to the end of the line of the input file. Commented text is ignored by \LaTeX entirely, and will not be typeset. Recall that we may avoid this special behavior by prefixing a backslash character:

<i>Typed as ...</i>	<i>Displayed as ...</i>
total is 23\% of adjusted gross	total is 23% of adjusted gross

(Refer to section 4.2 for the complete list of special characters and how to type them.)

\LaTeX attempts to fill up each line of a paragraph optimally, and sometimes we need to provide some advice for where *not* to create a line break. The function of the tilde (~) special character is to tie adjoining words together with an “unbreakable space” so that they are not split between lines. This is often useful to ensure that honorific titles don't get separated from their name (e.g., “Frau.~Blucher”, “Dr.~Frankenstein”), or after certain abbreviations (e.g., “a vs.~b”, “cf.~Fig.~5”), or where numbered entities are referenced, (e.g., “page~23”).

4.5 Document Divisions

A \LaTeX document begins with a division called the “preamble”. In this section, you specify the document type, set up the document-wide processing settings (like page margins, or selecting the font size, for example), set the document’s title, author, and other such parameters, and perhaps load additional packages which provide new features for processing your document.

The rest of the document is called the document “body”. It begins with the \LaTeX command `\begin{document}`, and anything that comes before this command is considered part of the preamble. Some \LaTeX commands are only allowed in the preamble, while others are allowed only in the document body.

5 The fsuthesis Class

A standard \LaTeX installation comes with several pre-defined document types (called classes), such as article, book, and report. The fsuthesis class is an extension of the \LaTeX report class. In essence, the fsuthesis class provides all the features of report, along with customizations to meet the standards of FSU’s *Guidelines & Requirements for Electronic Theses, Treatises and Dissertations*, revised August 2013. The rest of this document describes how to use the features of the fsuthesis class, and introduces a few other functions provided by \LaTeX .

5.1 Files in the Package

Packaged along with this *User’s Guide* and the fsuthesis class file, you will find a folder called thesis-template. Within the folder is a small collection of files, a skeleton upon which you may build your own document. I suggest that you copy and rename this folder in a new location, giving your *magnum opus* its own workspace.

For now, we’ll assume that you have renamed the folder thesis. Inside the folder, you’ll find a file called mythesis.tex. This will be your document’s principal file. We will assume that you will create additional files in this folder to add to your document, assuming at least one file per chapter. You are free to rename any of these files as you like, as long as they end with the .tex extension.

The document skeleton constitutes a complete document as it stands, and you may run \LaTeX on mythesis.tex immediately if you need to test your installation. (How you invoke \LaTeX is platform-dependent, so you may need to refer to section 2 on INSTALLATION above for references specific to your environment. In the environments provided by Mi \TeX and Mac \TeX , processing your document is usually accomplished by a single button click.)

Besides the thesis-template folder, there is a sample folder which contains a more robust sample document, demonstrating features of \LaTeX and the fsuthesis class, as well as a few optional features which you may enable if you find them helpful.

5.2 The Document Preamble

If you look at the file `mythesis.tex`, you will see that it consists primarily of \LaTeX macros and “commented out” lines containing more \LaTeX macros. (Recall section 4.4.) As you add text and flesh out your document, you may “uncomment” additional lines in this primary file by removing the leading percent sign, thereby making the line active.

The document setup may look intimidating at first, but don’t let this deter you. The template document and the sample document provide you with some boiler-plate information: you can just fill in the blanks with your own data to get started quickly. You don’t have to know or understand all this stuff at first. I encourage you to look at the example files and review the output documents to see how they are correlated.

5.2.1 Document Options

The first line of every \LaTeX document declares the type of document to be processed, along with a few processing options. After some initial comments, the first line of the document skeleton file `mythesis.tex` contains the following:

```
\documentclass[11pt,expanded]{fsuthesis}
```

This line declares the document type to be `fsuthesis`, and that the text will be set in 11-point type using expanded spacing. (Note the optional arguments supplied in square brackets, and required argument provided in curly braces.)

Class `fsuthesis` is derived from the `report` class, so all the standard document options supported by `report` will be supported by `fsuthesis`. (See one of the \LaTeX references in section 3 for complete lists of document options.) The `fsuthesis` class provides four additional document options: `hardcopy`, `chapterleaders`, `expanded`, and `copyright`.

- | | |
|------------------|---|
| 10pt, 11pt, 12pt | These options select the font point size for the document. Without any specifications, 10pt is the default. (The standard \LaTeX <code>report</code> class supplies these options.) |
| chapterleaders | This option adds leader dots on chapter headings in the <i>Table of Contents</i> . Normally, chapter headings are displayed in bold type with a page number and <i>without</i> leader dots, while by default, sections and subsections are displayed with leader dots connecting their page numbers. If you write a thesis without sections or subsections, or if you suppress their display in the <i>Table of Contents</i> , then you might want to specify the <code>chapterleaders</code> option. |
| copyright | This option adds a copyright statement at the bottom of the title page. Though your thesis or dissertation is protected by copyright law already, you may wish to state the copyright ownership explicitly using this option. |
| expanded | This option expands line spacing by 50%. Some colleges, schools, or departments will prefer expanded spacing to allow committee members to pencil in comments. In addition, ETD requires that the document <i>not</i> be single-spaced. |

hardcopy This option adds extra space along the binding edge of a page. This may be useful for printing hard copies for review by your thesis committee, or if you want to have a professionally bound copy of your thesis or dissertation. If you also include the standard report option `twoside`, then in addition to the binding-edge offset, all the chapters of your document will be forced to start on odd-numbered (right-hand) pages.

5.2.2 Thesis/Dissertation Description Macros

The next section in `mythesis.tex` contains several macros that customize the title page and committee page of your document. As a general rule, these macros require text arguments that should be given in mixed case using title capitalization rules (i.e., each word capitalized, except for articles, prepositions, and conjunctions; refer to your discipline’s preferred style guide if in doubt). All proper names should be capitalized normally. If the FSU *Guidelines* require elements to be displayed differently (all-caps, for example), the `fsuthesis` class will make the adjustments required for you. These macros all belong in the preamble.

`\title` This macro declares the title of your thesis or dissertation. If the title is long, it will be broken over several lines on the title page. You can control how the title is broken into lines two ways: using the \TeX line-separator operator (`\`) to force a line break, or using the word tie (`~`) between words to prevent a line break. (The line-separator command is what the \TeX manual calls “fragile”, and so you must say `\protect\` when it is used in the argument of the `\title` command. See the example in the box below.)

`\author` This macro stores your name. Your name should be given as specified in the FSU *Guidelines*.

`\college` This macro should contain the official name of your school or college.

`\department` If your degree comes from a school or college with separate academic departments which issue degrees, the `\department` macro should declare this name. Otherwise, you should comment-out or delete the `\department` line from your document file.

`\manuscripttype` This should be set to one of the following words, as appropriate: Thesis, Treatise, or Dissertation.

`\degree` The title of your degree (e.g., “Master of Arts” or “Doctor of Philosophy”) is given by the `\degree` macro.

`\degreeyear` The year your degree is awarded should be set here. This must be a full 4-digit year.

`\defensedate` Use the `\defensedate` macro to specify the date of your thesis, treatise, or dissertation defense. Refer to the FSU *Guidelines* for the appropriate format.

In your own document up to this point, you could have something like the following (after the initial `\documentclass` command):

```
\title{This Is My Title:\protect\ And This Is Its Second Line}
\author{Viktor Spoyles}
\college{College of Arts and Sciences}
```

```
\department{Department of Physics}
\manuscripttype{Dissertation}
\degree{Doctor of Philosophy}
\degreeyear{2015}
\defensedate{October 31, 2015}
```

If you are generating a PDF file, you can add a subject and search keywords to the document’s “metadata”. This information is not printed in your document at all, but it becomes part of the electronic version of the document’s internal description. The title and author’s name will already be included in the metadata by default. Since the document metadata are searchable, adding keywords and a subject may assist people who may be looking for research like yours.

`\subject` A terse description of the manuscript topic.

`\keywords` A comma- or semi-colon-separated list of germane keywords.

```
\subject{FTL Propulsion Theory}
\keywords{warp drive; wormhole travel; subspace geometry}
```

5.2.3 Committee Macros

`\committeeperson` The fsuthesis class provides macros for generating your committee information page. The `\committeeperson` macro takes two arguments. The first argument is the name of the committee member, given without titles. The second argument is the committee membership status, e.g., “Professor Directing Dissertation” or “Committee Member”. (See the FSU *Guidelines* about the appropriate options.) You should provide one `\committeeperson` line for each person, in the order in which they should appear on the committee page.

```
\committeeperson{Arthur Vandelay}{Professor Directing Thesis}
\committeeperson{Whoopsie Daisy}{Committee Member}
\committeeperson{Garnet G. Adirolf}{Committee Member}
```

5.3 The Document Body

Environment: `document` With the document setup complete, you start the document body with the \LaTeX command `\begin{document}`. You will notice that whenever you `\begin{something}`, you should always supply a corresponding `\end{something}` or \LaTeX will complain. So at the end of `mythesis.tex`, you will find the `\end{document}` command. Anything beyond this point in the file is ignored by \LaTeX . In \LaTeX parlance, anything enclosed within a `\begin{something} ... \end{something}` pair is called an “environment”. We’ll encounter several environments along the way.

5.3.1 Front Matter

\frontmatter The first element after `\begin{document}` should be the macro command `\frontmatter`, which sets up roman numeral page numbering for the document elements that precede the first chapter of your thesis or dissertation. The document skeleton in `mythesis.tex` contains place-holders in the proper order for all the optional elements of the front matter. Uncomment those elements that you will use, or you may leave commented or delete those elements that you don't use.

\maketitle Once `\frontmatter` has set the stage, the macro command `\maketitle` will generate the document title page. Likewise, the `\makecommitteepage` macro will create the committee page. Information for these pages is gathered from the data you have already set in macro calls in the preamble.

```
\begin{document}
\frontmatter
\maketitle
\makecommitteepage
```

Environment: dedication If you wish to include an optional dedication in your thesis or dissertation, uncomment the `\begin{dedication}` and `\end{dedication}` lines, and type your dedication between them. The text that you insert will appear about 1/3rd of the distance from the top of the page. The rest of the formatting is up to you.

```
\begin{dedication}
  \begin{center}
    To my parents
  \end{center}
\end{dedication}
```

Environment: acknowledgments Likewise, if you wish to include acknowledgments in your document, uncomment the `\begin{acknowledgments}` and `\end{acknowledgments}` lines, and insert the acknowledgment text between these lines. The resulting page will have the centered heading **ACKNOWLEDGMENTS**, followed by your text.

```
\begin{acknowledgments}
Thanks to my committee, especially my major professor.
\end{acknowledgments}
```

\tableofcontents The next item in the front matter is the *Table of Contents*, which is generated for you automatically by the macro `\tableofcontents`. By default, the *Contents* page(s) will contain entries for the remaining front matter material, and entries for chapter headings, section

headings, and subsection headings. If you find your *Table of Contents* has too much detail, you may adjust the level of headings included. (See section 7.1.)

`\listoftables`
`\listoffigures`
`\listofmusex`

The FSU *Guidelines* state that if you have more than one figure or table in your document, the figures and/or tables should be contained in their own lists. Turn each of these options on by uncommenting the `\listoftables` and/or `\listoffigures` lines in `mythesis.tex`. These tables will be generated for you automatically when your document is processed. For those documents which contain multiple musical examples, a list of these may also be generated by uncommenting `\listofmusex`.

```
\tableofcontents
\listoftables
\listoffigures
\listofmusex
```

Environment: `listofsymbols`
`listofabbrevs`

If a *List of Symbols* or *List of Abbreviations* might be helpful to your readers, `fsuthesis` provides these environments. If you wish to include such document elements, uncomment the appropriate `\begin ... \end` pair, and add any text you may require.

These entities would likely consist of tabular material, so you'll want to dig into \LaTeX table-making using any of the basic references mentioned in section 3. Below is a simple example of how you might use these environments to create tables with some useful information if needed.

```
\begin{listofsymbols}
  \begin{center}\begin{tabular}{r l}
    $E$ & Energy--Mass equivalence:  $mc^2$  \\
    $R_e$ & Mean Radius of the Earth,  $\approx 6367.65$  km \\
    $\pi$ &  $3.1415926\dots$ 
  \end{tabular}\end{center}
\end{listofsymbols}
```

```
\begin{listofabbrevs}
  \begin{center}\begin{tabular}{l l}
    i.e. & \textit{id est}, 'that is' \\
    e.g. & \textit{exempli gratia}, 'for example'
  \end{tabular}\end{center}
\end{listofabbrevs}
```

Environment: `abstract`

The last element of the front matter is a document abstract. Insert your text between the `abstract \begin ... \end` pair. The proper heading is included for you automatically.

```
\begin{abstract}
This abstract is a concrete example.
\end{abstract}
```

5.4 The Main Text

`\mainmatter` At last, with the preliminaries out of the way, you may now get to the meat of your document. Following the abstract, the command `\mainmatter` restarts page numbering at “1” in arabic numerals, ready for your first chapter.

The skeleton file `mythesis.tex` has been set up to include the first chapter from an external file. Note the command `\input`:

```
\input chapter1
```

This tells \LaTeX to insert the text of the file `chapter1.tex` at this position and continue processing. (The file extension is appended automatically.) There is nothing special about the file names, except that they should end with the extension `.tex`. Otherwise, you may call the external files whatever you like. (However, avoid using filenames with spaces or special symbols, as these may be difficult for either \LaTeX or your operating system to handle properly.) You can break up large chapters into even smaller pieces if you like, and then change `mythesis.tex` accordingly, e.g.,

```
\input chapter1a
\input chapter1b
```

Or you could just continue adding text to `mythesis.tex` directly, avoiding having to deal with any other external files entirely. This is all up to you.

5.4.1 Chapter and Section Headings

`\chapter` Several levels of headings are provided by the `fsuthesis` class in the heading styles defined by FSU’s *Guidelines*. By default, entries down to the subsection level are listed in the *Table of Contents*. (See section 7.1 for information on changing this default.) Listed from the highest level downward, these sectioning commands are:

- `\subsubsection` `\paragraph` `\subparagraph`
 - `\chapter{My Chapter Title}`
 - `\section{A Main Section Heading}`
 - `\subsection{The Subsection Heading}`
 - `\subsubsection{A Subsubsection Title}`
 - `\paragraph{Do You Need This Many Levels?}`
 - `\subparagraph{Come On, You’re Kidding!}`

Each of these macros takes a single argument, the text of the heading. All headings should be capitalized as titles, i.e., mixed case text, each word capitalized except articles, prepositions, and conjunctions. Chapter headings will force the start of a new page. The file `chapter1.tex` in the thesis folder has some example text to get you started. (If any of your headings include math symbols, you may want to activate the `textcase` package. See section 7.5 for more information.)

By default, section and subsection headings are prefixed by section and subsection numbers. Sub-subsections produce an unnumbered in-line heading in bold-face type as the opening of a paragraph. Paragraph and sub-paragraph headings also produce in-line headings and start new paragraphs, but with progressively subtler font selections. If you like, you may change the level at which headings are numbered. See section 7.2 for more information.

5.5 Back Matter

\appendix Following the major chapters of your manuscript, you may have additional material for one appendix or more. To shift from chapter headings to appendix headings, insert the macro `\appendix` at the end of your last chapter, before the first appendix. Then use the `\chapter` macro just as you have for each of your chapters. (Appendices will be lettered rather than numbered.)

```
\appendix
\input appendix1
\input appendix2
```

5.5.1 References/Bibliography

Environment: The `fsuthesis` class provides two options to produce a bibliography or references section.
references The first (and simplest) option is to use the `references` environment. Begin this section with `\begin{references}`. Then add each bibliographic entry with a blank line between each reference. Follow the last entry with `\end{references}`. With this option, you will have to format each entry according to the style guide you have chosen to follow.

```
\begin{references}
Picaut, J., F. Masia, and Y. du Penhoat, 1997: An advective--reflective
conceptual model for the oscillatory nature of the ENSO.
\textit{Science}, \textbf{277}, 663--666.

Yasunari, T., 1990: Impact of Indian monsoon on the coupled
atmosphere/ocean system in the tropical Pacific.
\textit{Meteor. Atmos. Phys.}, \textbf{44}, 19--41.
\end{references}
```

This example provides two bibliography entries. I had to specify the style-guide preferences myself (such as presenting journal names in italic type, volume numbers in bold-face, etc.). Once these are processed, they'll look like the following:

Picaut, J., F. Masia, and Y. du Penhoat, 1997: An advective–reflective conceptual model for the oscillatory nature of the ENSO. *Science*, **277**, 663–666.

Yasunari, T., 1990: Impact of Indian monsoon on the coupled atmosphere/ocean system in the tropical Pacific. *Meteor. Atmos. Phys.*, **44**, 19–41.

`\cite` The second option is to set up a BibTeX database. To use BibTeX, you create or download
`\bibliographystyle` a separate file of reference materials in a particular format. Then you may cite any of these
`\bibliography` references within your manuscript using the `\cite` macro. By running L^AT_EX in combination with BibTeX, citations are resolved, and a list of the cited references are pulled into your document automatically. To use this feature, you first select the bibliographic style, and then specify the BibTeX database file:

```
\bibliographystyle{plain}
\bibliography{myrefs}
```

This selects the plain bibliography style, and the BibTeX database is said to reside in `myrefs.bib`. Processing your document now requires a few extra steps as well:

- Run L^AT_EX
- Run BibTeX
- Run L^AT_EX *twice more*

If you have a relatively small number of bibliographic entries or citations, then choosing the references environment is probably the easiest solution. However, if you are trying to manage a large number of citations or work in a discipline that has already established a large BibTeX database, then it may save you considerable effort to learn how to use BibTeX, in which case you will certainly need to use one of the L^AT_EX references mentioned earlier.

Depending on your discipline, you may need more substantial citation and bibliography-formatting capabilities. Many disciplines and journals have created their own BibTeX styles, and you may want to take advantage of these efforts. First, you'll need to install the correct option package (see section 7.5 to get started). You should also check out the document in the sample directory for some more concrete examples.

5.5.2 Biographical Sketch

Environment: At last, you've reached the final page of your *magnum opus*. It will contain your biographical sketch, starting with `\begin{biosketch}`, and ending with `\end{biosketch}` as usual. Insert what biographical material you wish to include here, but remember not to include any personal contact information.

Once the biographical sketch is done, we wrap things up with the `\end{document}` command (matching the `\begin{document}` earlier in the file). Anything that follows `\end{document}` will be ignored by \LaTeX .

```
\begin{biosketch}
The author was born, educated, and re-educated
until this document was finally completed.
\end{biosketch}

\end{document}
```

6 More \LaTeX Features

6.1 List Environments

Environment: Standard \LaTeX provides a means of generating lists of things. A simple bulleted list can be created this way:

itemize
enumerate
description

Typed as ...

```
\begin{itemize}
\item Granny Smith Apples
\item Hominy Grits
\item Gruy\`ere Cheese
\end{itemize}
```

Displayed as ...

- Granny Smith Apples
- Hominy Grits
- Gruyère Cheese

Similarly, an enumerated list is constructed this way:

Typed as ...

```
\begin{enumerate}
\item Beat eggs until frothy.
\item Stir in milk.
\item Whisk in flour.
\end{enumerate}
```

Displayed as ...

1. Beat eggs until frothy.
2. Stir in milk.
3. Whisk in flour.

Yet another list style is provided by the description environment. This looks like the following:

Typed as ...

```
\begin{description}
\item[Green eggs] A delicacy.
\item[Ham] Cured pork.
\item[Sam I Am] Hawker of food.
\end{description}
```

Displayed as ...

Green eggs A delicacy.
Ham Cured pork.
Sam I Am Hawker of food.

You may also create lists inside of lists, mixing and matching `itemize`, `enumerate`, and `description` styles as necessary. Lists may also be customized in many ways, so if you need something fancier, you should read through one of the references.

6.2 Quotation Environments

Environment: `quote`
`quotation`

L^AT_EX provides for another common construction in documents: quotations. Quotations are set off from the rest of the text with narrower margins (and smaller line-spacing if the `expanded` option has been turned on). There are two varieties of quotation environments. For shorter quotations, use the `quote` environment. Each paragraph in the `quote` environment is not indented (though the margins are narrower), and there's just a small space added between them. This is appropriate for one or two-line quotes, or for a series of short quotations.

Typed as ...

```
\begin{quote}
```

Ars Longa, Vita Brevis.

Wow, that's a short quotation.
\end{quote}

Displayed as ...

Ars Longa, Vita Brevis.

Wow, that's a short quotation.

For longer quoted passages (one or more paragraphs), use the quotation environment. Each paragraph in the quotation environment is indented.

Typed as ...

```
\begin{quotation}
```

This quotation is a bit longer, just as a test.

And here's a second
paragraph now.
`\end{quotation}`

Displayed as ...

This quotation is a bit longer,
just as a test.

And here's a second paragraph now.

6.3 Single-Spacing Environment

Environment: If our document is being typeset in expanded spacing mode, there may be times when we prefer to typeset something in single-spaced mode. For this purpose, the `fsuthesis` class provides the `singlespaced` environment.

```
\begin{singlespaced}
This paragraph will be typeset
in single-space mode, even when I've
asked for expanded spacing.
\end{singlespaced}
```

You should not need this environment too often: lists and quotations already reduce their spacing for you. Also, if you are typing algorithms or computer code in L^AT_EX's `verbatim` environment, spacing has already been reset to single-space mode. If you have not set the `expanded spacing` document option, then this environment formats its contents as a regular paragraph.

6.4 Insertions: Figures, Tables, Musical Examples

Environment: Standard \LaTeX provides environments for figures and tables. The `fsuthesis` class provides an additional environment called `musex` for those authors who need to provide musical examples. The `musex` environment behaves similarly to the `figure` environment, except that captions include the heading “Example” instead of “Figure”, and all the musical examples can be listed in the front matter in the *List of Musical Examples*.

By setting material off in a `figure`, `table`, or `musex` environment, the material will be allowed to drift from its position in the text to the closest available location as follows: if there is space for the material at the bottom of the current page, it will be placed there; otherwise, it will be placed at the top of the next page, or perhaps on a page by itself. (You have some control over the placement of floating elements. For more detail, you’ll need to consult one of the \LaTeX references in section 3.)

`\caption` Each figure, table, or `musex` should contain a \LaTeX `\caption` command whose single argument contains the text of the caption. For figures and musical examples, the caption should be placed below the figure or musical example. For tables, the caption should be located above the tabular material. Examples of the use of each of these environments can be found in the `in` directory.

\LaTeX keeps track of the number of tables, figures, and musical examples, and your caption will be labeled and numbered automatically. The caption text will also be inserted into the appropriate *List of ...* if you requested the list in the front matter of your document.

\LaTeX has many features to assist you in producing tabular material of arbitrary complexity. Also, simple diagrams may be created using the \LaTeX `picture` environment. If you want to include graphics generated by external software, then you’ll need to learn to use the features of the `graphicx` package, and you should add the appropriate `\usepackage` command in `mythesis.tex` preamble (see section 7.5). You are strongly advised to refer to the \LaTeX references to learn more about figures and tables if you intend to use them in your manuscript.

6.5 Cross References

One of the advantages of working with \LaTeX is the ability to cross-reference equations, figures, tables, musical examples, and section headings. In writing and revising your manuscript, it is likely that references to elements may shift as text is added or moved around. \LaTeX addresses this problem by allowing you to assign a *label key* to each element. Then you make a reference to an element’s label key in your text to retrieve its number or page location. When your document is processed, \LaTeX replaces all the label key references with their numerical values.

As an example, let’s take a look at how this might work if we wish to refer to an equation in our text. The left column is the source text we’ve typed (unimportant text omitted for brevity), and the result is in the right column.

Typed as ...

```
Leonhard Euler was a prolific
...
Equation~\ref{eq:euler-id} on
page~\pageref{eq:euler-id} is
...
\begin{equation}
e^{i\pi} + 1 = 0
\label{eq:euler-id}
\end{equation}
```

Displayed as ...

Leonhard Euler was a prolific mathematician whose pioneering work in power series helped to develop the field of mathematical analysis. Equation 1 on page 19 is known as *Euler's Identity*, what physicist Richard Feynman called “the most remarkable formula in mathematics”.

$$e^{i\pi} + 1 = 0 \quad (1)$$

\label The equation environment automatically numbers equations for us. The command
\ref \label{eq:euler-id} creates the key “eq:euler-id”, tying it to the equation number.
\pageref To access the equation number, we use the \ref{eq:euler-id} macro, while the macro
 \pageref{eq:euler-id} retrieves the page number. For figures, tables, or musical examples,
 the \label command should immediately follow the \caption macro. In the example,
 you might also note the use of the tie special character between the \ref and \pageref
 commands and the text that precedes them (see section 4.4).

Since your text may \ref label keys before the corresponding \label has been encountered, you will need to run your document through the \LaTeX processor *at least twice*. The first pass will write all the label keys and page numbers out to an auxiliary file, and the second pass will then be able to resolve all the references properly. (\LaTeX will complain about unresolved or changed references, reminding you to run the processor a second time.)

As you’re writing your document, you might want to keep a list of the label keys you’ve created so that you don’t have to surf through other files to recall what a particular label key was. Keep in mind that figures, tables, musical examples, and equations all use the same label system, and all label keys must be unique. You may develop your own label key standards (like using eq: when referencing an equation, fig: to label a figure, etc., to avoid label “collision”). If you expect to have lots of figures, tables, etc., you may find it helpful to use descriptive label keys rather than generic ones, as they may be easier to remember. E.g., fig:map-Europe-pre1914 is probably more mnemonic than fig:MapOne.

6.6 A Note on Mathematics

\LaTeX excels at mathematical typesetting, but to get the best results, practice and experience go a long way. If you have a lot of math in your document, you owe it to yourself and to your audience to read through some of the \LaTeX references on the subject (see section 3).

Since I’ve seen this mistake in many documents, I will highlight one point here: treat equations as part of a paragraph. In terms of typing your document, this means that there should be no blank lines between text and displayed equations. The example which follows is a common idiom.

Typed as ...

This equation calculates the relationship index r :

```
\begin{equation}
r = a(N-1)
- \left(\sum_{j=1}^a j\right)
+ b - 1,
\end{equation}
where  $0 \leq a < b < N$ ,  $N$  is the
count of entities, and  $a$  and  $b$ 
are entity indices.
```

Displayed as ...

This equation calculates the relationship index r :

$$r = a(N - 1) - \left(\sum_{j=1}^a j \right) + b - 1, \quad (2)$$

where $0 \leq a < b < N$, N is the count of entities, and a and b are entity indices.

Blank lines surrounding the equation in the document source tell \LaTeX to leave too much vertical space, disconnecting it from the paragraph. Worse, the text following the equation would be indented as if it started a new paragraph, which is *not* the intention in this case. Of course, if an equation actually does begin or end a paragraph, then leave a blank line before or after, as appropriate.

7 Changing Default Settings

You may change document default settings in the document preamble. For example, should you want to change the width of the text column or the page margins, the document preamble is where you would do it. (Note that you must still adhere to FSU's *Guidelines*, so be sure you know what you're doing.)

7.1 Changing *Table of Contents* Detail

If listing section or subsection headings provides too much detail for your taste, you may remove these entries by resetting the \LaTeX counter `tocdepth`. \LaTeX considers chapter headings to be Level 0, section headings to be Level 1, and so on. The default setting of `tocdepth` is 2 (so subsection headings are included). To include only chapter and section headings in the *Contents*, for example, you could reset `tocdepth` in the document preamble with the following line:

```
\setcounter{tocdepth}{1}
```

If you set `tocdepth` to zero, then only chapter titles will be listed in the table of contents. In this case, you may want to enable the `chapterleaders` document option. (See section 5.2.1).

7.2 Changing the Level of Heading Numbering

You may change the level at which the heading macros produce numbered entries by setting `secnumdepth`. The default setting is level two, which means that headings up to subsections will be numbered automatically. To stop numbering at the section level (for example),

reduce the value of `secnumdepth` to one by issuing the following command in the document preamble:

```
\setcounter{secnumdepth}{1}
```

By setting `secnumdepth` to zero, you may disable all heading numbering except at the chapter level. Or you may increase the value up to five to generate heading numbers all the way down to the sub-paragraph heading level.

7.3 Avoiding Club and Widow Lines

\LaTeX makes some typographic decisions (for example, where to place a page break) based on a system of penalties that are calculated while the document is processed. The sample document sets the penalties for “widow” and “club” lines² as follows:

```
\widowpenalty=9999
\clubpenalty=9999
```

To \LaTeX , the value 10,000 is the maximum penalty. By setting these values to almost the maximum, \LaTeX will avoid generating widow or club lines in all but the most extreme cases.

7.4 Adjustments to Titles

Any of the headings in your document may be re-labeled, should you need to do so. The following is a table of heading variables and the default setting in the `fsuthesis` class.

<i>Variable Name</i>	<i>Default Text</i>	<i>Variable Name</i>	<i>Default Text</i>
<code>\abstractname</code>	Abstract	<code>\listabbrevname</code>	List of Abbreviations
<code>\acknowledgename</code>	Acknowledgments	<code>\listfigurename</code>	List of Figures
<code>\appendixtocname</code>	Appendix	<code>\listtablename</code>	List of Tables
<code>\bibname</code>	Bibliography	<code>\listmusexname</code>	List of Musical Examples
<code>\biosketchname</code>	Biographical Sketch	<code>\listsymname</code>	List of Symbols
<code>\contentsname</code>	Table of Contents	<code>\musexname</code>	Example

Should you wish to change any of these defaults — for example, you need to change “Bibliography” to “References” — you would add the following to the document preamble:

```
\renewcommand*{\bibname}{References}
```

Similarly, if you have more than one appendix, you may want to change `\appendixtocname` so that the entry in the table of contents is correct.

²The last line of a paragraph which occurs at the top of a page is called a “widow”; the first line of a paragraph which occurs at the bottom of a page is called a club. These are relatively ugly, typographically speaking.

```
\renewcommand*{\appendixtocname}{Appendices}
```

There's another way that this mechanism could be useful. Let's say that your document has a lot of maps associated with it, and you'd like to keep the lists of maps and figures separate. Further, you'd like to have a "List of Maps" included in the front matter of your document. You can do this by renaming some other environment that you're not using, say the List of Musical Examples.

```
\renewcommand*{\musexname}{Map}  
\renewcommand*{\listmusexname}{List of Maps}
```

Having done this, whenever you invoke the `musex` environment, the caption will be labeled with "Map" rather than "Example". If you include the `\listofmusex` in the front matter of your document, then "List of Maps" will be the heading of that page instead of "List of Musical Examples".

7.5 Extra Packages

L^AT_EX has many document feature add-ons. If you wish to load additional packages, these options should follow the document class selection. Be warned that some packages may not be compatible with the `fsuthesis` class. Many optional packages may already come installed with your T_EX/L^AT_EX distribution, or you can download and install them from the CTAN website (<http://www.ctan.org>). The skeleton document does not enable any additional packages. However, the `sample` folder provides several examples of external packages you may wish to use.

You enable features by adding a `\usepackage` command to the document preamble. Some packages provide sets of features or configuration options which can be enabled via the command line. Here are some examples:

```
\usepackage{amsmath}  
\usepackage[round]{natbib}
```

This loads the `amsmath` package with its default settings and options, and it loads the `natbib` package with the `round` option (which sets citations off in parentheses rather than square brackets). Read the package documentation! Packages may rely on other packages and options, and some combinations of packages may be incompatible.

The following list is by no means exhaustive. There are hundreds of packages available, but a few may be generally useful (or harmful) to a wide number of users, and so I highlight them here.

geometry, setspace *Do not use these packages with fsuthesis!* (unless you really know what you're doing). These packages will change page layouts and spacing, undoing

a lot of the hard work that fsuthesis has done for you. In many cases, interactions between settings in geometry or setspace and fsuthesis will cause ugly or non-compliant spacing. You have been warned!

amsmath The American Mathematical Society has developed a large set of symbols and macros to assist you in producing high-quality mathematics.

textcase If you have title, chapter, or section headings which include mathematic symbols, you may want to install the textcase package, as this will prevent the titling macros from upper-casing the math symbols inappropriately.

graphicx If you will be inserting figures into your document electronically, you should investigate the graphicx package. You can find some simple examples of figure inclusion in the sample directory, but for the highest quality output, you owe it to yourself to learn more about this topic. Searching the web for “latex figure inclusion” or other similar terms will turn up some useful links.

natbib, apacite, historian These packages provide alternatives for formatting citations and bibliographic reference lists. The document in the sample folder provides more citation examples, and provides links to other information regarding bibliography creation.

hyperref If you are generating an electronic version of your document for which you’d like to have hyperlinks automatically connecting cross-references and entries in the *Table of Contents*, you should activate the hyperref package. The hyperref package has lots of configuration options, and you should refer to its documentation for helpful information. The use of external hyperlinks within your document is discouraged. If you enable this package, be sure to turn color links *off*, as the *Guidelines* prohibit multi-colored text in your document.

8 Keeping Things in Order

If you have lots of figures or musical example files in your document, you may want to keep these files in the sub-folder already created for you. This helps to keep your thesis folder a little less cluttered. Then if you have a chart called pie.eps stored in the figures folder, you just need to include the folder name when issuing the \includegraphics command, e.g.,

```
\includegraphics{figures/pie.eps}
```

You can create any number of folders and sub-folders to help keep your files organized.

9 More Examples

The files in the `thesis-template` directory are only a bare-bones template to help you get started on your own manuscript. You will find a more complete example of a thesis manuscript in the `sample` directory. The \LaTeX source files in this directory contain explanatory comments and many more examples of useful code. The file `thesis.pdf` in the `sample` directory is the result of processing the source files, so you can easily compare the source files to the output to see how everything works. You'll find some simple examples of equations, figures, tables, and bibliographic citations to help you create your own document. You can find much more help from the web should you need more sophisticated examples.

10 Bugs, Corrections, Improvements

Should you discover what you think is a bug in the way that `fsuthesis` formats your document, you may e-mail me at `bwhissel@fsu.edu`. It would be helpful to send the portion of your document which you believe is misbehaving. Likewise, if you think that the appearance of theses or dissertations may be improved in some way, or if you have some macro definitions that you think may be generally useful and could be added to `fsuthesis`, I am happy to hear your ideas.

Also, if you think that any of this documentation is misleading or unclear, *please* let me know. I wish to make this *User's Guide* and the `fsuthesis` class as helpful as possible.

Please note that I cannot help you to learn features of \LaTeX : there are many resources and tutorials that are freely available, and I am unable to support individual requests for help with anything that does not pertain directly to the `fsuthesis` class.

Best wishes, and good luck!

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