

Guidelines for dissertations, theses, and project reports in
the Department of Computer Science and Engineering:
Typesetting using LaTeX

By

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Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Master of Science
in Computer Science
in the Department of Computer Science and Engineering

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This thesis explains how to produce a thesis using \LaTeX . Abstracts for technical publications should have the following characteristics.

Limit the length of the abstract: (1) less than 150 words for a master's thesis, (2) less than 350 words for a dissertation, (3) 100–150 words for IEEE journals, and (4) less than 250 words for conference papers.

Write a “report in miniature,” which means it has a self-contained message that does not expect the reader to look at the paper. Answer the questions, “What?” “How?” and “Why?” Use no citations, footnotes, or equations. Use no superlatives; you are not selling anything. Do not use acronyms and mathematical symbols unless absolutely necessary.

Key words: thesis, dissertation, LaTeX, book design, format, template

DEDICATION

To Angie.

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I thank contributors to this template's software especially Mr. Matthew C. Funk who improved the template in Spring 2012. I thank Mr. James Nail of the MSU Library for his guidance regarding MSU standards. I thank Angie Allen for helpful discussions regarding book design.

At a minimum, you should acknowledge financial support, permission to use copyrighted materials, trademarks and service marks, and personal assistance. The following is a hypothetical example; edit it with your information, and add your personal feelings.

This work was supported in part by grant CCR-999999 from the National Science Foundation. The findings and opinions in this thesis belong solely to the author, and are not necessarily those of the sponsor.

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LIST OF SYMBOLS, ABBREVIATIONS, AND NOMENCLATURE

This section is optional, and may be formatted in an appropriate manner. The title

`\listofsymbolsname` may be redefined as needed.

g A variable representing gnats

G A variable representing gnus

NASA National Aeronautics and Space Administration

gnat A small animal, found in the North Woods, that causes no end of trouble.

gnu A large animal, found in crossword puzzles, that causes no end of trouble.

The following are nonstandard \LaTeX commands that are defined by `msuthesis.cls`.

`\andeqnref`
`\begin{case}`
`\begin{cor}`
`\begin{defn}`
`\begin{lem}`
`\begin{pf}`
`\begin{thm}`
`\commacite`
`\defaultspacing`
`\eg`
`\eqnref`
`\Eqnref`
`\eqnsref`
`\Eqnsref`
`\etal`
`\etc`
`\Figure`
`\Figuredbl`
`\figureref`
`\Figureref`

`\ie`
`\newspacing`
`\periodcite`
`\qed`
`\rotatedfigure`
`\rotatedtable`
`\rotatedtablewithfigure`
`\singlespacing`
`\spacecite`
`\Table`
`\Tablecontinued`
`\Tabledbl`
`\Tabledblwithfigure`
`\tableref`
`\Tableref`
`\Tablewithfigure`
`\vs`

CHAPTER 1

INTRODUCTION

The goal of the MSU thesis template is to facilitate producing dissertations, theses, dissertation proposals, thesis proposals, and project reports in an acceptable form using the \LaTeX typesetting system.

1.1 What is \LaTeX ?

\LaTeX is a typesetting system that is used primarily in academia. \LaTeX files are compatible with many academic publishers' typesetting systems. For example, \LaTeX files are one of the preferred forms for final submission of articles to the various *IEEE Transactions*.

\LaTeX has very strong capabilities for typesetting mathematics beautifully and for managing bibliographies. Even though, its user interface is not “friendly” compared to commercial word processors, suitable style files obviate concern for detailed formatting issues. Consequently, some students will find it attractive for typesetting dissertations, theses, proposals, and project reports.

\LaTeX is a markup language which resembles a programming language. Consequently, learning to use \LaTeX is similar to learning a programming language. \LaTeX is open-source software, which is available for free over the Internet.¹ \LaTeX 2e is the current version.

¹See <http://www.ctan.org> for information.

Donald Knuth wrote the foundational typesetting software, T_EX, and Leslie Lamport wrote the initial version of L^AT_EX. T_EX is usually pronounced “tek”, similar to the “tech” in “technology”, and so L^AT_EX is often pronounced lah-tek or lay-tek.

Because L^AT_EX input files are ASCII, any text editor may be used to edit text files.

You will need to spend some effort learning to use L^AT_EX. Books and Web sites are readily available. Purchase a book on L^AT_EX! You will need it. There are several good books available; purchasing one is a good investment. There is also a wealth of information resources on the Web.² This guideline assumes you are familiar with L^AT_EX basics. Try some simple short documents as you study your L^AT_EX book before studying the details in this guideline.

This guideline is not a tutorial on L^AT_EX. However, it is an example. You can look at the *.tex files that are components of this document and see how to implement various features. Unless otherwise noted, commands are standard L^AT_EX features.³

This guideline describes how to typeset a document that is compatible with the requirements of Mississippi State University and the Department of Computer Science and Engineering using L^AT_EX and the MSU thesis template files. Even though it is not a thesis, this document is itself formatted like a master’s thesis, so its source files can be used as the starting point for your document.

²For example, <http://en.wikibooks.org/wiki/LaTeX>.

³Much of the tutorial material regarding standard L^AT_EX was supplied verbatim as documentation with the software.

1.2 University Requirements

The Graduate School of Mississippi State University publishes the *Standards for Preparing Theses and Dissertations* [8],⁴ which we refer to as the *Standards*. In the following, we use the word “document” to mean a dissertation, thesis, proposal, or project report in the Department of Computer Science and Engineering.

The University requires that all dissertations and theses comply with the *Standards*, latest edition.

1.3 Departmental Requirements

In addition to the university requirements, the Department of Computer Science and Engineering requires that all master’s project reports, master’s thesis proposals, and doctoral dissertation proposals also comply with the *Standards*. Even though the department may provide tools or templates to facilitate preparing a document, the student is fully responsible for assuring that the final document complies with the *Standards* and the departmental requirements reproduced below.

The *Standards* leave certain issues to be decided by the student’s department which in our case is the Department of Computer Science and Engineering. In addition to the University’s requirements, the following specifies departmental style requirements for dissertations, theses, proposals, and project reports, as published on the department Web site.⁵

1. The baseline type size shall be 12 points. Exceptions are explained in the *Standards*.
2. The base font style shall be one of the following:

- Times

⁴<http://www.grad.msstate.edu/current/publications/>

⁵<http://www.cse.msstate.edu/academics/gradstud/thesis.php>

- New Century Schoolbook
 - Palatino
 - Bookman
3. Section headings and subheadings within a chapter shall be numbered style.
 4. Chapter numbers shall be arabic numerals.
 5. Sections and subsections shall be numbered consecutively within the next higher-level section/subsection. A section number shall be formed by an arabic chapter numeral, a period, higher-level section numbers separated by periods, and finally the current subsection number. For example 2.3.4 denotes Chapter 2, the third section within Chapter 2, and the fourth subsection within section 2.3.
 6. Text shall be full-justified.
 7. Italics is required, rather than underline, for non-English, titles of books and journals, and similar uses.
 8. Per the *Standards*, all equations shall be numbered consecutively within chapters, enclosed by parentheses, and formed by an arabic chapter numeral, a period, and the equation number. For example, Equation (2.1) indicates the first equation in Chapter 2.
 9. Table and figure captions shall be centered style with title-style capitalization.
 10. Table and figure numbers shall be consecutive within chapters and formed by an arabic chapter numeral, a period, and the table/figure number. For example, Figure 2.1 indicates the first figure in Chapter 2.
 11. Reference entries shall be consecutively numbered enclosed by brackets, as is common in IEEE Computer Society journals and conference proceedings. Citations shall have corresponding form. For example [1] cites the first entry in the references.
 12. Multiple citations in one place shall be enclosed in one set of brackets, in ascending numerical order, delimited by commas, for example [1, 7, 22, 43].
 13. References shall follow the last chapter of text, rather than at the end of each chapter. If used, any appendices shall follow thereafter. The heading shall be REFERENCES.
 14. Reference entries shall be sorted alphabetically by authors' names, and book title, not order of appearance.
 15. The style of reference entries shall conform to examples at the Department of Computer Science and Engineering Web site,⁶ which follows IEEE Computer Society practices. We prefer the Computer Society style rather than the IEEE Transactions Department style.

⁶<http://www.cse.msstate.edu/academics/gradstud/references.php>

The references in this document conform to departmental requirements and match IEEE Computer Society examples,⁷ except for the following details.

- Full journal and conference names are used instead of abbreviations.
- Full state names are used instead of abbreviations.
- Conference paper entries show the sponsoring organization and city of the conference, instead of the publisher of the proceedings and publisher's city.

1.4 Limitations of this Template

The MSU thesis template has the following limitations.

- The template supports centered style captions for figures and tables, not block-style captions, even though the *Standards* allow either. Captions can be longer than one line.

The information that might have been in a block-style caption can be within the table or figure, or can be in an ordinary paragraph that describes the table or figure.

- When a subsection title immediately follows a section title, a special section command is required to get the proper spacing between the titles. See section 4.4 for details.
- Long tables are not handled cleanly by the template. If a table continues on successive pages, entries for the continuation pages must be manually removed from the List of Tables by editing the `*.lot` file, which is awkward. See section 5.1 for details.
- The template supports either art work for figures in Encapsulated Postscript graphics files (`*.eps`), or for figures in Joint Photographic Experts Group (`*.jpg`), Portable Network Graphics (`*.png`), or Portable Document Format (`*.pdf`) formats.
- Art work that appears in more than one figure must be copied to files with different names.
- Side-by-side figures are not supported by this template. The template assumes that each figure takes the full width of a page (or has white space on either side).
- Subfigures are not directly supported by the template. We have not tested \LaTeX packages for subfigures available on the Web.

⁷http://www.computer.org/portal/web/publications/style_refs
(We prefer the Computer Society style rather than the IEEE Transactions Dept. style.)

- Subsubsections are not supported by this template (e.g. section 1.2.3.4.5).

CHAPTER 2

GETTING STARTED

Before a \LaTeX document can be compiled, appropriate software must be installed and setup. This chapter assumes a Windows XP or later operating system environment, and full administrative rights granted to the installing user account. The overall process has the following steps.

1. Install the MiK \TeX system.
2. Test \TeX works (included with MiK \TeX) to verify that MiK \TeX installed successfully.
3. Install the MSU thesis template.
4. Configure \TeX works for use with the MSU thesis template.
5. Test the MSU thesis template, by compiling this document.
6. Set up and compile your document.

2.1 Install MiK \TeX

MiK \TeX is a \LaTeX package for Windows. It consists of a large collection of components by many authors in the worldwide \LaTeX community. The 32-bit version is preferred, because, at of the time of this writing, the 64-bit version is experimental. (Other \LaTeX packages are available for other operating system environments.) The steps to install MiK \TeX change from time to time. The following highlights important choices.

- Download the latest version of MiKTeX from <http://miktex.org>. The Basic version is ok, because MiKTeX will later download the packages automatically as needed.
- Install for just you unless you are installing for other users of the target computer.
- Accept the default paths.
- Specify these settings:
 - Preferred paper: `letter`
 - Install missing packages on the fly: `yes`

It is very important to select letter-size paper. Many students make the mistake of letting the default size be European A4 size, which the MSU Library will not accept.

2.2 Test TeXworks

TeXworks is a convenient word processor included with all MiKTeX installations. The instructions here assume that you are using TeXworks. All L^AT_EX files are ASCII text except graphics files and the final `*.pdf` document. While virtually any text editor can be used to create L^AT_EX documents, TeXworks is very convenient.

Test whether MiKTeX is installed properly by the following steps.

1. Run the TeXworks program, by clicking Start menu, All Programs, MiKTeX 2.9, and TeXworks.
2. Select Help, and A short manual for TeXworks.
3. Read Chapter 3 “First steps” and do the exercise in section 3.1 “Creating a document.”

2.3 Install the MSU Thesis Template

The MSU thesis template consists of the following major components collected together in the `msuexamplethesis.zip` file. Compilation of the example thesis will generate other files.

- A \LaTeX class file, `msuthesis.cls`, which defines the document style
- A $\text{BIB}\TeX$ bibliography style file, `msucs.bst`, which defines the references style of the Department of Computer Science and Engineering. Other bibliography styles are provided with \LaTeX and yet others are available on the Web.
- Batch files for compiling documents using \TeX works, `compile_pdf.bat` and `compile_eps.bat`
- A file with empty templates for references, `empty.bib`
- Source files for this example thesis document.
 - A primary \LaTeX source file for the example thesis, `examplethesis.tex`
 - Other \LaTeX source files, `*.tex`
 - A $\text{BIB}\TeX$ references file, `ieeecsexamples.bib`
 - Graphics files in various formats for figures

The following steps will install the MSU thesis template.

1. Create a separate directory for the MSU thesis template.
2. Download the MSU thesis template files to your directory from the Computer Science and Engineering Department Web site.
`http://www.cse.msstate.edu/~allen/Msuthesis.`
We recommend downloading the `*.zip` file instead of downloading the files of the template one by one.
3. Extract all files from the `*.zip` file using Windows features.
4. Change the name of the file `compile_pdf.bat!` to `compile_pdf.bat`, and similarly, change the name of `compile_eps.bat!` to `compile_eps.bat`. This is necessary to avoid problems with some antivirus software while downloading.

2.4 Configure T_EXworks

By default, T_EXworks is not configured to properly compile documents with the MSU thesis template. To configure T_EXworks, do the following steps.

1. Run T_EXworks.
2. Click **Edit, Preferences, and Typesetting**. See the **Processing tools** area. Click on the button with the plus (+) sign in the lower right corner.
3. For *.pdf, *.png, and *.jpg graphics files, in the **Tool Configuration** window, specify these parameters:
 - (a) **Name:** Compile_pdf
 - (b) **Program:** select **Browse...**, and navigate to select the compile_pdf.bat file provided in the MSU thesis template.
 - (c) **Arguments:** Add an argument by clicking on the plus (+) sign in the lower right corner, and type \$basename in the space provided.
 - (d) Check **View PDF** after running.
 - (e) Click **OK**.
4. Similarly for *.eps graphics files, click on the button with the plus (+) sign in the lower right corner, and in the **Tool Configuration** window, specify these parameters:
 - (a) **Name:** Compile_eps
 - (b) **Program:** select **Browse...**, and navigate to select the compile_eps.bat file provided in the MSU thesis template.
 - (c) **Arguments:** Add an argument by clicking on the plus (+) sign in the lower right corner, and type \$basename in the space provided.
 - (d) Check **View PDF** after running.
 - (e) Click **OK**.
5. At the bottom of the **Processing tools** area for **Default:**, choose **Compile_pdf** or **Compile_eps**, according to the type of graphics files you expect to normally use for figures. Choose **Compile_pdf** if you plan to use *.jpg, *.png, and *.pdf files. Choose **Compile_eps** if you plan to use *.eps only.
6. Click **OK**.

2.5 Compile the Example Thesis

You can compile a document either using \TeX works to run a batch file or using the command line.

Each compile outputs a log file (`examplethesis.log`) which may have error messages. You must check for error messages at each step by examining `examplethesis.log`; \TeX works normally displays the log file at the bottom of the window in the **Console** output tab. Unfortunately, \LaTeX error messages are not always easy to understand. $\text{BIB}\TeX$ also outputs a log file (`examplethesis.blg`) which may have error messages; the example thesis references are purposely missing some author names and $\text{BIB}\TeX$ issues warnings accordingly. You should carefully examine the final output file, `examplethesis.pdf`, for anything that violates the *Standards*. Adobe Acrobat Reader seems to print `*.pdf` files better than \TeX works.

2.5.1 Compile Using \TeX works

Use the following commands to typeset this document using \TeX works.

1. In the example thesis directory, double click on `examplethesis.tex`. This will run \TeX works and open the editor for this file.
2. Edit the graphics format declaration. A `%` makes the rest of the line a comment. Put a `%` on the line you want disabled and remove the `%` from the line you want enabled, according to the type of graphics files you plan to use. For example,

```
\usepackage[pdftex]{graphicx}      %MSU%%for *.jpg, etc.  
\usepackage[dvips]{graphicx}     %MSU%%for *.eps only
```

3. Verify that the processing tool in the space in the top left of the \TeX works window is the batch file you want for the type of graphics file you plan to use: **Compile_pdf** or **Compile_eps**.
4. Click the green button in the top left to begin compilation.

5. The log file will be displayed in the **Console output** tab at the bottom of the **T_EXworks** window.
6. The resulting `examplethesis.pdf` will open in a new **T_EXworks** window or will refresh if the `examplethesis.pdf` window is already open.

If there is an error, the **Console output** tab will show the error message. Press the red **X** button in the top left (where the green compile button was) to cancel the compile.

2.5.2 Compile Using the Command Line

If you prefer not to use **T_EXworks** to run the batch file, you can run the commands in the batch file at the Windows command line one by one.

2.5.2.1 Compile with PDF Graphics

The following steps will compile the example thesis for `*.pdf`, `*.png`, and `*.jpg` graphics files.

1. Open the Windows command line window and navigate to your example thesis directory.
2. At the Windows command line run the following commands.

```
pdflatex examplethesis
bibtex examplethesis
pdflatex examplethesis
pdflatex examplethesis
pdflatex examplethesis
```

The repeated `pdflatex` commands are necessary to resolve cross-references.

3. The resulting log files and `examplethesis.pdf` are now in the directory.

2.5.2.2 Compile with EPS Graphics

The following steps will compile the example thesis for *.eps graphics files.

1. Open the Windows command line window and navigate to your example thesis directory.
2. At the Windows command line run the following commands.

```
latex examplethesis
bibtex examplethesis
latex examplethesis
latex examplethesis
latex examplethesis
dvips -t letter examplethesis
dvi2pdf -p letter examplethesis
```

The repeated latex commands are necessary to resolve cross-references.

3. The resulting log files and examplethesis.pdf are now in the directory.

2.6 Compile Your Thesis

The overall process of preparing your thesis has the following steps.

1. Make a separate directory for your thesis.
2. Copy all the example thesis files to your thesis directory. Later, you can throw away files that you do not need.
3. Prepare your bibliography file(s), *.bib.

A bibliography file (*.bib) is a structured ASCII file that is a database shared by all your papers and your thesis. L^AT_EX automatically creates a References list for your document, selecting only those entries in the *.bib file that are cited. This is a major advantage of L^AT_EX. Your BibTeX files (*.bib) should be in the same directory as your document.¹ See Chapter 3.

4. Copy examplethesis.tex to your own file name, for example, thesis.tex.
5. Edit your main thesis file, e.g. thesis.tex.

¹Advanced L^AT_EX users may take advantage of MiK_TE_X's directory structure and paths.

- (a) Edit the name of your *.bib files in the definition of \biblist.
 - (b) Edit the front matter information.
 - (c) Edit the signature blocks of the approval page. Prepare as many blocks as you need. The University allows multiple pages for very large Graduate Committees.
 - (d) Edit the name of your abstract file.
 - (e) Edit the dedication.
 - (f) Edit the name of your acknowledgments file.
 - (g) Edit the name of your list of symbols file, if any. Remove the related commands if a list of symbols is not needed.
 - (h) Edit the title of each chapter and its file name, and similarly, each appendix.
6. Write the body of your document, making a separate file for each chapter. Similarly, write any appendices in separate files. See Chapter 4.
 7. Write the abstract in a separate file.
 8. Write the acknowledgments in a separate file.
 9. Compile your document, resulting in a *.pdf file

For your initial test, most of the component files can be copies of components of the example thesis, which you will replace as you write your thesis.

2.6.1 Compile Using T_EXworks

Use the following commands to typeset your thesis using T_EXworks.

1. In the your thesis directory, double click on your thesis.tex. This will run T_EXworks and open the editor for this file.
2. Edit the graphics format declaration. A % makes the rest of the line a comment. Put a % on the line you want disabled and remove the % from the line you want enabled, according to the type of graphics files you plan to use. For example,

```
\usepackage[pdftex]{graphicx}      %MSU%%%for *.jpg, etc.
%\usepackage[dvips]{graphicx}     %MSU%%%for *.eps only
```

3. Verify that the processing tool in the space in the top left of the T_EXworks window is the batch file you want for the type of graphics files you plan to use: `Compile_pdf` or `Compile_eps`.

4. Click the green button in the top left to begin compilation.
5. The log file will be displayed in the Console output tab at the bottom of the T_EXworks window.
6. The resulting `thesis.pdf` will open in a new T_EXworks window.

If there is an error, the Console output tab will show the error message. Press the red X button in the top left (where the green compile button was) to cancel the compile.

2.6.2 Compile Using the Command Line

If you prefer not to use T_EXworks to run the batch file, you can run the commands in the batch file at the Windows command line one by one.

2.6.2.1 Compile with PDF Graphics

The following steps will compile your thesis for `*.pdf`, `*.png`, and `*.jpg` graphics files.

1. Open the Windows command line window and navigate to your thesis directory.
2. At the Windows command line run the following commands.

```
pdflatex thesis
bibtex thesis
pdflatex thesis
pdflatex thesis
pdflatex thesis
```

The repeated `pdflatex` commands are necessary to resolve cross-references.

3. The resulting log files and `thesis.pdf` are now in the directory.

2.6.2.2 Compile with EPS Graphics

The following steps will compile your thesis for `*.eps` graphics files.

1. Open the Windows command line window and navigate to your thesis directory.
2. At the Windows command line run the following commands.

```
latex thesis
bibtex thesis
latex thesis
latex thesis
latex thesis
dvips -t letter thesis
dvi2pdf -p letter thesis
```

The repeated `latex` commands are necessary to resolve cross-references.

3. The resulting log files and `thesis.pdf` are now in the directory.

CHAPTER 3

PREPARING REFERENCES

The MSU thesis template includes the bibliography style `msucs.bst` which `BIBTEX` uses to create the references section of your thesis in the style required by the Department of Computer Science and Engineering. The following are examples in the References and guidance from the IEEE Computer Society regarding the information in your `*.bib` file(s).

- Article in a collection [1]
- Article in a conference proceedings [18]
- Article in a journal or magazine [17]
- Book [2, 13]
- CD-ROM [14]
- Dissertation or thesis [7, 15]
- Electronic publication [4]
- Newsletter [5]
- Non-English source, when original title is included [20], and when original title is unprintable [12]
- Personal communication and unpublished materials are usually not referenced because they are not available to the reader. However, footnotes can be used to give credit to such sources. General thanks can be given in an acknowledgments section.
- Standard [10, 11]
- Technical memo [16]

- Technical report with report number [9] and without report number [19]
- Technical or user manual without authors [3]

To achieve proper references and citations, follow these steps, and note the discussion in sections below.

1. Get bibliographic data and articles from publishers' databases.
2. Plan your *.bib files (one vs. multiple).
3. Create an abbreviations *.bib file.
4. Edit your *.bib files.
5. Edit the body of your thesis (*.tex), inserting citation commands.
6. Compile your thesis.
7. Check the body of your *.pdf thesis for unresolved citations, which look like this, [?]. Correct the citation code or your *.bib file(s).
8. Check the references in your *.pdf thesis for complete information and correct format. Correct your *.bib file(s) where necessary.

3.1 Using EndNote and BIBTEX

This section explains the advantages of using EndNote and BIBTEX to manage your bibliography data. EndNote is a software package for papers and publications written with MS Word that organizes bibliographies, and therefore saves time in writing articles, term papers, theses and dissertations. EndNote imports references from publishers' databases without the need to manually enter the reference information, and formats the resulting references. BIBTEX manages bibliography data for documents written using L^AT_EX. BIBTEX has many benefits such as ease of changing bibliography style, consistency of bibliography entries, and correct numbering and sequential ordering of bibliography entries. However, BIBTEX does not interface with publishers' databases. Therefore, using EndNote

and BIB_TE_X together helps reduce the time to manage bibliography data for documents prepared using L_AT_EX, especially when you have a large number of references.

Members of the MSU community may purchase EndNote at Access Services in the Mitchell Memorial Library. BIB_TE_X is free and is included with L_AT_EX packages.

First of all, EndNote needs to be installed on your machine. A overview of installing and using EndNote in MS Windows is explained at http://www.endnote.com/support/helpdocs/ENX5_GettingStartedGuide_Win.pdf.

BIB_TE_X is installed as part of your L_AT_EX installation.

3.1.1 Using EndNote with Publishers' Databases

We can export bibliographic data for articles from major databases like ACM Digital Library, IEEE Electronic Library (IEEE Xplore), Scopus, ComputerScience Index and Google Scholar. The following shows how to export citation entries from IEEE Xplore to EndNote.

1. Search for articles in the IEEE database.
2. Select all the articles that you want to export from the IEEE database to EndNote.
3. Click Download Citations icon at the top of the search page.
4. You have an option to include the abstract into your citation entry. Select the radio button Citation and Abstract from the Include: panel.
5. In the Format: panel select the last option. EndNote
6. Click Download Citations button.
7. You are now done with the publisher's database.
8. The *.RIS file is saved in the location you specified.
9. Double click the *.RIS file to load the reference data into EndNote.

The process for other publishers' databases is similar.

3.1.2 Transferring Data from EndNote to BIB_TE_X

When using EndNote, make sure that your output style is BIB_TE_X. Select Edit, Output Styles, and then choose BIB_TE_X Export.

Previewing the output format can be done by clicking on the Preview tab under the reference list.

Follow the steps below to transfer data from EndNote to BIB_TE_X.

Exporting one reference to BIB_TE_X.

1. Select the reference that you want to export by clicking on that reference.
2. Select File, Export... on the menu bar.
3. Choose the directory and type the name of the file that you want to save the reference to in the File name: textbox (e.g. myBib.bib).
4. Click Save.

Exporting all reference to BIB_TE_X.

1. Press `Ctrl A` on your keyboard to select every reference you have in EndNote.
2. Select File, Export... on the menu bar.
3. Choose the directory and type the name of the file that you want to save the reference to in the File name: text box (e.g.myBib.bib).
4. Click Save.

Exporting some references to BIB_TE_X.

1. Create a group of references that your want to export to BIB_TE_X by selecting Groups, Create Group on the menu bar.
2. Type in your group name in the text box that appears under My Groups on the left panal (e.g. thesis group).
3. Right click on the reference that you want to add to the group and select Add References To, thesis group or hold the `Ctrl` button and click on multiple references and right click to select Add References To, thesis group.

4. Repeat the previous steps until every reference you want to export is added in the group.
5. Select **File, Export...** on the menu bar.
6. Choose the directory and type the name of the file that you want to save the reference to in the **File name:** textbox (e.g. `myBib.bib`).
7. Click **Save**.

3.2 Managing Your Bibliography Data

You may spread your bibliography among multiple `*.bib` files, e.g., by subject and/or author. If so, the definition of `\biblist` in `thesis.tex` would look like this.

```
\renewcommand{\biblist}{bibfile1,bibfile2}.
```

Spaces are not allowed inside the braces (`{...}`).

The `ieeecsexamples.bib` file for this document is an example. See chapters on BibTeX in your L^AT_EX book.

The file `empty.bib` has templates for various kinds of entries. Use your editor to cut and paste entry templates as you need them. According to your L^AT_EX book, some fields are required, some are optional, and some are not used in bibliographies; the unused fields can hold information for other purposes. For example, I like to list keywords in each bibliographic entry, so I can find all references on a topic by using a text editor's find feature. The following fields are never used in traditional bibliography formats, but may be useful for your personal reference.

- `KEYWORDS` — your favorite search terms
- `ANNOTE` — notes to yourself, such as related articles
- `INLIBRARY` — where can I find this again?
- `ISBN` — publisher's code

- ABSTRACT — a copy of the abstract or a summary

Compare `empty.bib` to `ieeecsexamples.bib`. The most common bibliographic entries are `@BOOK` [6], `@ARTICLE` [17], and `@INPROCEEDINGS` [18].

The first field in an entry is the `citekey`. You need to devise an easy-to-remember system of `citekey` codes that is very likely to give a unique `citekey` for each bibliography entry. In general, the `citekeys` in the `*.bib` files are case-sensitive.

For example, my coding system is based on the initials of the authors' last names, the year of publication, and an abbreviation for the magazine or conference [17, 18]. I distinguish ambiguous situations by an appended page number. The labels for books are based on initials and year [6]. Single authors are represented by last name (e.g., `Allen`) instead of initials. Other people use different coding schemes. The important point is that each `citekey` must be unique.

Empty fields are represented by empty braces, `{ }`. Text goes inside braces, and numbers do not need braces. BibTeX has three-letter abbreviations for the months of the year which do not go in braces, `jan`, `feb`, etc. See the BibTeX section of your L^AT_EX book for details.

3.3 How to Create an Abbreviations Bibliography File

For consistency and convenience, some abbreviations could be used in BibTeX such as journal name and society name. For example, “ACM Transactions on Software Engineering and Methodology” is a long name. In order to do so, start up TeXWorks or a simple text editor and then follow these steps.

1. Create a file to contain a list of abbreviation e.g. `abbrv.bib` using the following syntax, for example, `\@STRING{TOSEM = "{ACM} Transactions on Software Engineering and Methodology"\}`
2. Save your edit.
3. In your bibliography data file (e.g. `myBib.bib`) file, go to the reference entry that you want to edit.
4. Edit the abbreviation that you want to use for that field (e.g. the journal name `TOSEM`), without enclosing braces. For example, `journal = TOSEM,`
5. Save your edit.
6. Open your main LaTeX file (e.g. `thesis.tex`) for editing, add your abbreviation `*.bib` file name (e.g. `abbrv`) in `\newcommand{\biblist}{abbrv,myBib}` where `abbrv.bib` is the file that contains your abbreviation list and `myBib.bib` contains bibliography data.

3.4 Editing BIB_TE_X Data

Some data formats in EndNote are not compatible with BIB_TE_X and L_AT_EX. The following items of each reference need to be checked and edited by editing your `*.bib` file using TeXworks or a simple text editor.

- **Label:** Add a unique label to identify each `*.bib` entry, such as `Allen02METRICS`. For example, this should look like the following on the first line of the `*.bib` entry, `@INPROCEEDINGS{Allen02METRICS,`
- **Author name:** Edit the author name to include the first name, if known, instead of just initials. You may need this information later, even if your favorite bibliography style only uses initials.
- **Author name:** Make sure that the order of each author name is correct (first name, middle name and last name). Setup EndNote's Export feature to make this happen by doing the following.
 1. Select Edit, Output Styles, Edit, BibTeX Export.
 2. Select Author Name under Bibliography. You will see drop down boxes on the right side of the window.
 3. Select John Smith for First author, John Doe for Other authors and Full-name for Initials.

- Author name: Edit multi-word family names to enclose with braces, so the entire family name is treated as the last name.
- Author name: Edit international names to add \LaTeX commands for any special characters or accents.
- Title: Edit titles to be “initial caps” style (also called “title style”) capitalizing the first letter of all major words, not sentence style where only the first word is capitalized.
- Title: Edit acronyms in titles to be all capitalized enclosed with braces.
- Title: Edit proper names in the titles to be initial caps enclosed in braces.
- Pages: Put double hyphens (--) instead of only one hyphen for a range of pages.
- Book name: Correct the word order of each conference proceedings book name to match the title page of the book. On-line databases sometimes have the title page of the proceedings book in a file called “frontmatter.”

In references to electronic publications, be sure to include all punctuation exactly as supplied (hyphens and tildes (~), in particular, are very common in Web addresses). Tilde is produced by $\$ \sim \$$ in \LaTeX . If you have a URL that has an underline, you must substitute $_$ for the plain underline. Do not include Web addresses in publishers’ databases; the reference to the paper version is preferred.

Verify addresses you tag as URLs by copying and pasting them into your browser and seeing if the string of text that is in your document actually goes where it should. If the address must run across more than one line, follow these guidelines:

- Break only after a forward slash or a dot (period).
- Do not split the double slash.
- Do not split at hyphens, tildes, and so on, that are part of the address.
- Do not introduce hyphens to break words.
- Separating the extension (for example, the html at the end) is discouraged.

Some examples using

`http://www.web-pac.com/mall/pacific/start.html:`

Acceptable:

`http://
www.web-pac.com/mall/pacific/start.html`

`http://www.web-pac.
com/mall/pacific/start.html`

`http://www.web-pac.com/mall/
pacific/start.html`

Not acceptable:

`http://
/www.web-pac.com/mall/pacific/start.html`

`http://www.web-
pac.com/mall/pacific/start.html`

`http://www.web-pac
.com/mall/pacific/start.html`

`http://www.web-pac.com/mall/paci-
fic/start.html`

Discouraged:

`http://www.web-pac.com/mall/pacific/start.
html`

In titles and captions, capitalize the first and last words, and all nouns, pronouns, adjectives, verbs, adverbs, and subordinating conjunctions, even though the capitalization in the publication may be sentence style. Lowercase articles, coordinating conjunctions, and prepositions, regardless of length. Example: Toward Better Real-Time Programming through Dataflow.

To make a source easy for researchers to find, use the title as it originally appears. Do not add or remove hyphens, change words to preferred spellings, or convert to lowercase.

Do not include the editor's name for a conference proceedings unless it is a carefully edited volume published as a regular book.

The IEEE Computer Society's Web page also has detailed advice regarding references to electronic publications and other matters.¹

3.5 Citations

Standard L^AT_EX provides the `\cite` command to insert citations into paragraphs. For your convenience, `msuthesis.cls` provides commands that combine punctuation and citation. For example, this citation [8] is in the middle of a sentence. This citation [8], is combined with a comma, and this citation is combined with a period [8]. Journals have various styles of citations which differ in where spaces and punctuation should go. Your thesis may be one style and the final submission of a journal article may be a different style. You may use the following commands so that changes are easy to make.

```
\spacecite{biblabels} %in the middle of a sentence  
\commacite{biblabels} %includes a comma  
\periodcite{biblabels}%includes a period
```

¹See <http://computer.org/portal/web/publications/style.refs>.

CHAPTER 4

TYPESETTING THE BODY OF YOUR THESIS

This chapter has suggestions to make preparing your document easier. The IEEE Computer Society’s advice to authors will also be generally helpful to you, especially the details in the Special Sections.¹ This chapter explains tips and commands that will help you properly typeset the body of your thesis. This guideline assumes that you will submit articles based on your thesis for publication in journals and conferences. Consequently, this chapter includes a variety of commands defined by `msuthesis.cls` that you can redefine when you are preparing an article for a journal. Thus, your writing (`*.tex`) will need few modifications to conform to the journal’s style requirements. Some journals and conferences provide \LaTeX style files, as well.

4.1 Organize Your Files

You may be able to publish the content of individual chapters of your thesis or dissertation as journal articles. Note that journal articles do not have chapters. To allow for possible publication, put all `\chapter` commands in your main thesis file (e.g. `thesis.tex`), and let `\section` be the highest level in any chapter file.

¹<http://computer.org/portal/web/publications/styleguide>

You may organize additional source files hierarchically and use the \LaTeX command `\input{filename}` to insert portions of a chapter into its chapter file. Put all your files in the same directory.

4.2 Local Definitions

You can put your own local \LaTeX command definitions in the front of your main file (`thesis.tex`). Create commands for abbreviations for lengthy mathematical expressions, or to print a word in a special font. Definitions, like the following should be prior to the `\begin{document}` command in your `thesis.tex` file.

I prefer the small caps font style (`\textsc`) for acronyms. As in the following example, most acronyms look better in the small capitals font (`\textsc`), so creating similar pairs of new commands for each acronym will save you work and avoid inconsistency, for example, NASA in the middle of a sentence or NASA at the beginning of a sentence. Complex combinations of fonts can be defined as commands, such as “ θ_{low} is a lower bound.”

```
\newcommand{\NASA}{\textsc{nasa}\xspace}
\newcommand{\Nasa}{\textsc{Nasa}\xspace}
\newcommand{\thetalow}{\theta_{\mbox{\scriptsize\rm low}}}
```

4.3 Chapter Titles

Use the `\chapter` command to define chapter titles. This command has been redefined by `msuthesis.cls` to produce proper tables of contents.

Long titles are supported by `msuthesis.cls`.

This template provides arabic chapter numbers.

4.4 Section Titles

4.4.1 Subsection Title without Paragraph

4.4.1.1 Subsection Title with Paragraph

If there is no paragraph following a section title, because a subsection immediately follows, use the appropriate `msuthesis.cls` command so that the spacing between titles conforms to the *Standards*. Note there are no capital letters in the command names.

```
\sectionnoparagraph{This is a Title}  
\subsectionnoparagraph{This is a Title}  
\subsubsectionnoparagraph{This is a Title}
```

Similar commands with capital letters (“camel-case”) are deprecated, and therefore should no longer be used with this template. They will work, but are not recommended, for example, `\SectionNoParagraph`.

4.4.1.2 Another Subsubsection test

Each level of the outline should have at least two items.

4.5 When There is a Paragraph

The standard \LaTeX commands `\section`, `\subsection`, and `\subsubsection`, with lower case ‘s’ will work when there is a paragraph following the section title.

```
\section{This is a Title}  
This is a paragraph.  
\subsection{This is a Title}  
This is a paragraph.  
\subsubsection{This is a Title}  
This is a paragraph.
```

Similar commands with capital letters (“camel-case”) are deprecated, and therefore should no longer be used with this template. They will work, but are not recommended, namely, `\Section`, `\SubSection`, and `\SubSubSection`.

Titled paragraphs. The standard \LaTeX command `\paragraph` can be used to define titled paragraphs. The text of the paragraph begins on the same line as the title. These titled paragraphs are not included in the table of contents.

4.6 Paragraphs

One or more blank lines denote the end of a paragraph.

You can change to and from the default spacing between lines to single spacing by using the following commands. Changing spacing of parts of paragraphs is not supported.

Enclose one or more paragraphs as shown.

```
\par\newspacing{\singlespacing}\vspace{\baselineskip}
This is a single-spaced paragraph.
\par\newspacing{\defaultspacing}
```

The `\par`, `\vspace` and `\baselineskip` commands are standard \LaTeX commands. `msuthesis.cls` defines the following command.

- `\newspacing`
- `\singlespacing`
- `\defaultspacing`

4.7 Justification

The thesis template full-justifies all paragraphs. The ends of words and sentences are marked by spaces. It doesn't matter how many spaces you type; one is as good as 100. The end of a line counts as a space.

Since any number of consecutive spaces are treated like a single one, the formatting of the input file makes no difference to \LaTeX , but it makes a difference to you. When you use \LaTeX , making your input file (`*.tex`) as easy to read as possible will be a great help as you write your document and when you change it.

4.8 Special Considerations

Because printing is different from typewriting, there are a number of things that you have to do differently when preparing an input file than if you were just typing the document directly. See your \LaTeX book for details on all of the following, and the source file for this chapter.

4.8.1 Quotation Marks

Quotation marks like “this” have to be handled specially, as do quotes within quotes: “ ‘this’ is what I just wrote, not ‘that’ ”. Don't use the double quote key (") for quotation marks. Use the grave accent key (`) twice for beginning quotation marks, and use the apostrophe key (') twice for end quotation marks.

4.8.2 Dashes

Dashes come in three sizes: an intra-word dash (–), a medium dash (—) for number ranges like 1–2, and a punctuation dash (---) — like this.

4.8.3 Spaces

L^AT_EX automatically makes a sentence-ending space larger than the space between words within a sentence.

4.8.3.1 Space After a Period

You sometimes have to type special commands in conjunction with punctuation characters to get this right, as in the following sentence.

“Gnats, gnus, etc. all begin with G.”

Note that the space after etc. is smaller than the space after the end of the sentence. You should check the spaces after periods when reading your output to make sure you haven’t forgotten any special cases. See your L^AT_EX book regarding the ’\ ’ and ’\@’ commands.

4.8.3.2 Ellipsis

Generating an ellipsis ... with the right spacing around the periods requires a special command, `\ldots`.

4.8.4 Special Characters

L^AT_EX interprets some common characters as commands, so you must type special commands to generate them. These characters include the following: \$ & % # { and }.

4.8.5 Emphasized Type

In printing, text may be emphasized by using an *italic* type style, denoted by the `\em` command.

A long segment of text can also be emphasized in this way. Text within such a segment given additional emphasis with Roman type. Italic type loses its ability to emphasize and become simply distracting when used excessively.

The University’s *Standards* discourages the use of italics for emphasis, but italics is accepted for mathematics.

4.8.6 Line Breaks

There are standard commands to prevent L^AT_EX from breaking a line where it might otherwise do so. This may be at a space, as between the “Mr.” and “Jones” in “Mr. Jones”, or within a word—especially when the word is a symbol like *itemnum* that makes little sense when hyphenated across lines. See your L^AT_EX book for details.

4.9 Footnotes

Footnotes² pose no problem.

4.10 Quotations

Text is displayed by indenting it from the left margin. Quotations are commonly displayed. There are short quotations

This is a short a quotation. It consists of a single paragraph of text. There is no paragraph indentation.

²This is an example of a footnote.

and longer ones.

This is a longer quotation. It consists of two paragraphs of text. The beginning of each paragraph is indicated by an extra indentation.

This is the second paragraph of the quotation. It is just as dull as the first paragraph.

4.11 Lists

Another frequently-displayed structure is a list. The following is an example of an itemized list.

- This is the first item of an itemized list. Each item in the list is marked with a “tick”. The document style determines what kind of tick mark is used.
- This is the second item of the list. It contains another list nested inside it. The inner list is an enumerated list.
 1. This is the first item of an enumerated list that is nested within the itemized list.
 2. This is the second item of the inner list. \LaTeX allows you to nest lists deeper than you really should.

This is the rest of the second item of the outer list. It is no more interesting than any other part of the item.

- This is the third item of the list.

4.12 Poetry

You can even display poetry.

There is an environment for verse
Whose features some poets will curse.

For instead of making
Them do all line breaking,
It allows them to put too many words on a line when they’d rather be forced to
be terse.

4.13 Common Abbreviations

`msuthesis.cls` provides commands to produce abbreviations of common Latin expressions for compatibility with various journals. Some journals require italics and some require Roman fonts. The abbreviations are: *etc.*, *e.g.*, *i.e.*, *et al.*, and *vs.* Various publishers prefer different fonts for certain abbreviations. The following commands are available to provide flexibility when a thesis chapter is published as a journal article.

```
\etc  
\ie  
\eg  
\etal  
\vs
```

Note that periods after abbreviations are included inside each command.

CHAPTER 5

TYPESETTING TABLES AND FIGURES

This chapter presents features that will help you add figures and tables to your thesis. If you have several consecutive pages of figures and tables (called “floats” in publishing jargon), the University strongly recommends that you complete your text discussion to a logical break, and then force a page break followed by the floats. The \LaTeX command `\clearpage` will force a page break and typeset all pending floats up to that point.

5.1 Tables

`msuthesis.cls` takes care of formatting tables, captions, and the associated List of Tables entries. The following are two examples. Table 5.1 lists meat prices for gnats, gnus, and other animals, and Table 5.2 is in landscape orientation; it also has a footnote as an example.

For ordinary tables use `\Table{filename}{This is a caption}`. Note the capital ‘T’. The file `filename.tex` contains the content of the table, for example,

```
\begin{tabular}{...}  
\hline  
headings \\  
\hline  
... tabular data  
\hline  
\end{tabular}
```

Table 5.1

Meat Prices (Portrait)

	Item	Price (\$)
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99

Long captions are supported by `msuthesis.cls`. Do not put footnotes or citations in captions, because they will be repeated in the List of Tables.

Sometimes a table needs to be displayed in landscape orientation. Put the content of the table (i.e., the `\begin{tabular}` environment) in a file (`filename.tex`). The following shows how to set up and define such a table.

```
\setlength{\tabwidth}{\textheight}
\addtolength{\tabwidth}{-0.5in}
\rotatedtable{filename}{This is a Caption}
```

This makes the rotated table 0.25 inch narrower on each side than one page height (about 8.5 inches).

Sometimes a table is in a graphics file. Each of the following commands have similar arguments as the corresponding Figure commands below.

```
\Tablewithfigure{filename}{\tabwidth}{Caption Goes Here}
\Tabledblwithfigure{filename}{\tabwidth}{A Caption}
\rotatedtablewithfigure{filename}{\tabwidth}{A Caption}
```

This template does not handle long tables cleanly. The following is a workaround. If your table is longer than one page, you must segment the content into multiple files. Use

Table 5.2

Meat Prices (Landscape)

Item ^a	Price (\$)	more columns
gnats	13.65	a very wide column
gnats	.01	
gnu	92.50	
emur	33.33	
armadillo	8.99	

^aThis table is in landscape orientation.

an ordinary `\Table` command for the first page, and then use a `\Tablecontinued` command for each following page. For example, the following commands create a table with two pages. Note that the table number does not change.

```
\Table{pricesfirst}{Meat Prices} %first page
\Tablecontinued{pricesnext}{(continued)}
%next page
```

The MSU Library requires the caption of second and following pages to be only “(continued)”.

However, each page of the table is in the List of Tables. Unfortunately, this must be cleaned up by manually editing the `*.lot` file. The existing version of this file is inserted into the document each time you run `LATEX`, and then it is replaced by a new version. If you edit this file, then you should run `LATEX` only once on your last edit cycle (`pdflatex` if using `*.pdf` etc. `graphics` or `latex`, `dvips`, `dvipdfm` if using `*.eps` `graphics`). In summary, try to avoid multipage tables to avoid this complex manual process.

If a table needs to span the full page in a double-column publication, use the `\Tabledbl` command. In a single-column thesis, it looks the same as the `\Table` command.

Journals have various standards for referring to table numbers in paragraphs. The following commands are defined by `msuthesis.cls` as alternatives to the standard `LATEX` command `\Table \ref{tab:filename}`.

```
\tableref{filename} %in middle of sentence
\Tableref{filename} %as first word of sentence
```

where `filename` is the identifier for your table data.

Table 5.3

Meat Prices

	Item	Price (\$)
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33

Table 5.3

(continued)

Item		Price (\$)
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33
armadillo	frozen	8.99
gnats	gram	13.65
gnats	each	.01
gnu	stuffed	92.50
emur	stuffed	33.33

The content of tables is formatted with the \LaTeX environment

```
\begin{tabular}{...}  
\hline  
headings \\  
\hline  
... tabular data  
\hline  
\end{tabular}
```

See your \LaTeX book for details. `\hline` creates a horizontal line. Most journals discourage using vertical lines in tables, and prefer few horizontal lines. If at all possible, use only a top horizontal line, a bottom horizontal line, and a line under the headings.

The length `\tabwidth` is already defined by `msuthesis.cls`. In general, the `tabular` environment takes care of table widths. However, if you need to specify the width of a column in a table, redefine `\tabwidth` relative to `\linewidth`, just prior to defining the table, and then use it as needed within your `tabular` environment. For example, for one half of the line width, use this command.

```
\setlength{\tabwidth}{0.5\linewidth}
```

`msuthesis.cls` constructs a label by making `tab:` a prefix to your file name, so if needed, you can use `\ref{tab:filename}`. Journals have various standards for referring to table numbers in paragraphs. The following commands are alternatives to the standard \LaTeX command `\ref{tab:filename}`.

```
\tbleref{filename} %in middle of sentence  
\Tableref{filename} %as first word of sentence
```

where `filename` is the identifier for your table data.

5.2 Figures

The following is an example. A lion, as shown in Figure 5.1, eats gnus. Gnats eat lions.



Figure 5.1

Lion

`Compile_pdf.bat` expects all art work to be `*.jpg`, `*.png`, or `*.pdf` with no embedded captions. Vector graphics encapsulated in `*.pdf` files will scale better than raster graphics.

`Compile_eps.bat` expects all art work to be `*.eps` files with no embedded captions.

If you do not yet have your art work, then you may copy the file `temporary.jpg` or `temporary.eps` to the proper filename for temporary use. For example, we do not yet have a drawing of a gnat, so Figure 5.2 is a temporary placeholder.

***** figure goes here *****

Figure 5.2

Gnat

Text in your thesis is in a single column that is about 6 inches wide. However, text in conference proceedings is often in two columns. The \LaTeX length `\textwidth` is the width of all columns on a page. The \LaTeX length `\linewidth` is the width of the current column.

The length `\figwidth` is defined by `msuthesis.cls`. In general, redefine the width of each figure relative to `\linewidth`, just prior to defining a figure. For example, for a one-column figure that is almost the full width of the column, you should put the following. (Note that `Figure` is capitalized.)

```
\setlength{\figwidth}{\linewidth}
\addtolength{\figwidth}{-0.5in}
\Figure{filename}{\figwidth}{This is a Caption}
```

You can also specify fractions of a line width, for example, for a figure width of half a line,

```
\setlength{\figwidth}{0.5\linewidth}
```

Sometimes a figure needs to be displayed in landscape orientation. The following shows how to set up and define such a figure using `msuthesis.cls`.

```
\setlength{\figwidth}{\textheight}
\addtolength{\figwidth}{-0.5in}
\rotatedfigure{filename}{\figwidth}{This is a caption}
```

Long captions are supported by `msuthesis.cls`. Do not put footnotes or citations in captions, because they will be repeated in the List of Figures.

Some journals and conference proceedings are published in two column format. Some figures fit within one column, but others must span both columns (usually at the top of a

page. The following command is used when you want the figure to span two columns if the document is in two-column format. If this command is used in a one column document, such as a thesis, then the figure is typeset the same as the ordinary `\Figure` command.

```
\Figuredbl{filename}{\figwidth}{This is a Caption}
```

This command lets your thesis chapter's `*.tex` file be practically the same as your conference paper's with respect to figures.

Journals have various styles for referring to figure numbers in paragraphs. The following commands are defined by `msuthesis.cls` as alternatives to the standard \LaTeX command `Figure~\ref{fig:filename}`.

```
\figureref{filename} %in middle of sentence  
\Figureref{filename} %as first word of sentence
```

where `filename` is the identifier for your art work.

CHAPTER 6

TYPESETTING MATHEMATICS

6.1 Embedded Mathematics

L^AT_EX is good at typesetting mathematical formulas embedded in ordinary text, like $x - 3y = 7\alpha$ or $\alpha_1 > x^{2n}/y^{2n} > x'$. Remember that a letter like x is a formula when it denotes a mathematical symbol, and should be treated as one. Avoid stacking symbols and tall symbols when mathematics is embedded in paragraphs, because it distorts line spacing.

6.2 Displayed Mathematics

Mathematical formulas may also be displayed, separated from paragraphs by white space. The *Standards* requires all equations to be numbered. The `\begin{equation}` environment, and `\label` command should be used to generate the equation number.

$$x' + y^2 = z_i^2 \tag{6.1}$$

A simple displayed formula is one-line long; multiline formulas require special formatting commands and the `\begin{eqnarray}` environment.

Don't start a paragraph with a displayed equation, nor make one a paragraph by itself.

You should use `\begin{equation}` and `\end{equation}` to define one equation so that equation numbers are generated, instead of `\[` and `\]`. It is convenient to use `\begin{eqnarray}` and `\end{eqnarray}` to define all equations just in case a long

equation needs to be broken into multiple lines later. See your \LaTeX book for the syntax details.

Reference an equation like this: Equation (6.1). If you need to reference an equation number, put a `\label{eq:label}` command at the end of the equation. Journals have various standards for referring to equation numbers in paragraphs. The following commands are provided by `msuthesis.cls` as an alternative to the standard \LaTeX command `Equation~(\ref{eq:label})`.

```

\eqnref{lable}           %in middle of sentence
\eqnsref{firstlabel}    %in middle of sentence
\andeqnref{lastlabel}   %at end of list
\Eqnref{label}          %at start of sentence
\Eqnsref{firstlabel}    %at start of sentence

```

If you are referring to one equation, use `\eqnref{label}`, or as the first word in a sentence, `\Eqnref{label}`. If you are referring to a list of equation numbers, use

```

\eqnsref{firstlabel}, \ref{eq:secondlabel},
\andeqnref{thirdlabel}

```

or similarly, at the beginning of a sentence, `\Eqnsref{firstlabel}` etc. Equation (6.2) is an example of a multiline equation.

$$\begin{aligned}
 y &= ax + b \\
 &+ cx + d
 \end{aligned}
 \tag{6.2}$$

6.3 Theorems

The following theorem environments are defined by `msuthesis.cls` for compatibility with journals published by Elsevier and Springer.

```

\begin{thm} %Theorem
\begin{lem} %Lemma
\begin{cor} %Corollary
\begin{defn} %Definition
\begin{case} %Case
\begin{pf} %Proof

```

The command `\qed` is defined by `msuthesis.cls` to produce a black box; it is used by the `pf` environment at the end of proofs.

The *Standards* allows bold theorem titles and italics theorem text which is the L^AT_EX default style.

The following are examples of these.

Theorem 1 (Title of theorem)

This is an example theorem.

Proof: This is a proof. ■

Lemma 1 (Title of lemma)

This is an example lemma.

Proof: This is another proof. ■

Corollary 1 (Title of corollary)

This is an example corollary.

Definition 1 (Title of definition)

This is an example definition.

Case 1 (Title of case) *This is an example case.*

Case 2 (Another title of another case) *This is another case.*

CHAPTER 7

FREQUENTLY ASKED QUESTIONS

7.1 How can I remove DRAFT on the title page?

The third line of `examplethesis.tex` is

```
\usepackage[light,first]{draftcopy} %remove for final
```

Putting a `%` at the beginning of this line will make this line a comment, disabling DRAFT.

7.2 Why can't L^AT_EX find my files?

You must put all files for your document in the same directory, including all the graphics files. A warning in the `*.log` file may indicate that you had a command like the following: `\Figure{./Drawings/tiles_fuel}{...}`. The template cannot handle paths. Remove paths in all `\Figure`, `\Table`, and `\input` commands.

7.3 How do I create subsubsection 3.5.3.1.1?

The template does not support subsubsubsections.

They are usually short and can often be included in the higher-level subsubsection. A sentence or two could make the transition for the reader in lieu of a subsubsubsection title.

An alternative workaround is to create a list. See your L^AT_EX book for details.

7.4 How do I make block-style captions?

Some journals use a block-caption style, where the caption explains the figure or table. This template does not support block-caption style. The template supports centered caption style.

However, a user of the template provided the following substitute code which adds a note to the `\Figure` command and to the `\Table` command. Text for a note explaining the figure or table goes in the argument and appears below the figure or table, not as part of the caption.

In between your paragraphs, you provide the following commands to define a figure or table, for example:

```
\setlength{\figwidth}{0.4\linewidth}
\Figure{lion}{\figwidth}{Lion}{A note goes here.}

\Table{prices}{Meat Prices}{A note goes here.}
```

In `msuthesis.cls`, you modify the `\Figure` and `\Table` command definitions.

```
\newcommand{\Figure}[4]{
\newspacing{\singlespacing}\par
\begin{figure}
\begin{center}
\noindent
\includegraphics[width=#2]{#1}   %%MSU
\end{center}
\caption{#3}
\settowidth{\tmplen}{\protect{#4}}
\ifthenelse{\tmplen>0}{%
\begin{quote}
#4
\end{quote}
}{} %end if
\addtocontents{lof}{\vspace{\baselineskip}}
%%MSU for multiline caption
```



```

\label{fig:#1}
\end{figure}
\newspacing{\defaultspacing}
}

\newcommand{\Table}[3]{%
\newspacing{\singlspacing}\par
\begin{table}
\caption{#2}
\addtocontents{lot}{\vspace{\baselineskip}}
%MSU for multiline caption
\label{tab:#1}
\begin{center}
\input{#1}
\settowidth{\tmplen}{\protect{#3}}
\ifthenelse{\tmplen>0}{%
\begin{quote}
#3
\end{quote}
}{} %end if
\end{center}
\end{table}
\par\newspacing{\defaultspacing}
}

```

7.5 How do I fix “not enough memory for figures and tables”?

A large number of figure/tables on consecutive pages causes \LaTeX to become confused due to limited memory. When you have numerous consecutive “floats” (i.e. figures or tables), you should have a `\clearpage` command between groups of three to five floats. The command `\clearpage` forces a page break and typesets all known floats beginning on the new page. So you should position the `\clearpage` commands at points you want a page break to occur, such as between consecutive figures.

7.6 How can I refer to a list of equations, tables, or figures?

Here are three examples of lists of references.

```
\eqnsref{aaa}, \ref{eq:bbb}, \andeqnref{ccc}
Tables~\ref{tab:aaa}, \ref{tab:bbb}, and~\ref{tab:ccc}
Figures~\ref{fig:aaa}, \ref{fig:bbb}, and~\ref{fig:ccc}
```

7.7 How can I make a table heading span more than one column?

See your \LaTeX book for commands associated with the tabular environment, such as `\multicolumn`.

7.8 Why is a missing \$ inserted?

When your `*.log` file has this warning, `! Missing $ inserted.`, this is most often caused by the use of underline characters in nonmath mode. If you have a filename, URL, etc. that has an underline in the middle of a paragraph, you must substitute `_` for the plain underline.

Plain underline is interpreted as a subscript command in math mode. \LaTeX assumes you want to begin math mode.

7.9 How can I typeset “John Wiley & Sons” in a reference?

BibTeX fields can have \LaTeX commands like paragraphs. Ampersand is a special character. See your \LaTeX book for escape sequences for special characters, such as `\&`.

7.10 How can I typeset a tilda in a URL?

Tilda is a special character in \LaTeX . A “similar” symbol (\sim) looks good in URLs. It is created by `\sim`. See Section 3.4.

7.11 How can I change to single spacing?

See Section 4.6.

7.12 How can I change to bold and then back to normal print?

See your \LaTeX book for commands associated with fonts, such as `\bfseries`, `\mdseries`, `\textbf`, and `\textnormal`.

7.13 How can I create a superscript or subscript?

See your \LaTeX book for math mode formatting symbols, such as `^` and `_`.

7.14 How can I make a fraction in an equation?

See your \LaTeX book for math mode commands, such as `\frac` in displayed equations. Stacked fractions are ugly inline in paragraphs; use `/` instead to represent division in paragraphs.

7.15 How can I typeset all my references?

Even though \LaTeX provides a `\nocite{*}` command, which causes all references in the `*.bib` file to be in the References section, I recommend that you just put a `\cite` command for each reference in any convenient place in your draft document. Later you can add the sentences to go with each citation. Because the *Standards* requires that all references be cited, your final thesis should not use `\nocite` at all.

7.16 Why is there an extra quotation mark in my reference?

In your `*.bib` file, articles, proceedings papers, miscellaneous, etc. are expected to have an article title which will be enclosed by quotation marks. If the article title is missing, BibTeX supplies comma, quote, quote (,”) anyway. Therefore, in this template, a nonempty `TITLE` is required in all types of references that have articles, including the `MISC` type of reference.

CHAPTER 8

CONCLUSIONS

The concluding chapter synthesizes the chapters in the body of the thesis, explaining how the research problem has been answered.

8.1 Contributions

This example thesis made no contribution to knowledge of science and technology.

8.2 For Further Research

Gnats and gnus is a fascinating subject with many possible topics for further research.

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APPENDIX A

AN APPENDIX TITLE

A.1 Similar to a Chapter

Appendices are written like the body of the paper using `\chapter`. \LaTeX numbers them with capital letters.

The MSU library requires that each appendix have a separator page. The following lines in `examplethesis.tex` achieve this.

```
%MSU library requires title page for each appendix
\renewcommand{\appendixname}{\vspace*{2.5in}Appendix}
%for appendix title page
\chapter{An Appendix Title}
\newpage %end of appendix title page
\input{exappendix} %content of appendix
```

The `\vspace*` command provides the proper layout of the title page. The `\newpage` command forces a page break after the title page. Use the `\chapter` command for each appendix, and put `\newpage` after each `\chapter` command.

A.2 Another Appendix Section

An appendix can have multiple sections.