The CSU Northridge Masters Thesis LaTeX 2ε class*

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Abstract

LaTeX 2ε is a professional document typesetting program. It is a commonly accepted document preparation system used, or recognized, by most of the mathematic and scientific disciplines. LaTeX's ability to handle and typeset mathematical equations properly and with minimum effort is outstanding. Its knowledge and implementation of professional typesetting rules and behaviors is second to none. The biggest advantage over alternative document applications is that LaTeX allows an author to ignore document formatting, and concentrate on the intellectual content instead.

The CSU Northridge Graduate Evaluator's office sets strict guidelines regarding the visual appearance and format of graduate theses. The CSUNthesis [10] class file was developed to enable CSU Northridge graduate students to prepare their thesis using LaTeX 2ε without having to learn the more advanced formatting concepts used to control the details of LaTeX. By using this class file, graduate students need to learn only the basics of LaTeX. The use of this class file also allows graduate students to concentrate on the content of their thesis topic and almost completely ignore the format and layout of the document.

The CSUNthesis class file correctly implements all the format requirements of the Graduate Evaluator's office for the preparation of graduate theses, projects and abstracts as presented in the *Guidelines for the preparation of theses, graduate projects and artistic abstracts* [8]

Please: Report any mistakes or problems with the CSUNthesis class file to the class file author at jeffw@csun.edu so that they may be permanently corrected.

Contents

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†The class file author acknowledges the significant contributions of Joohwan Lee, Amy Snetzler and Veerawan Sarbua for their patience and invaluable assistance in pointing out and helping to correct my initial blunders while creating the class file.

1 Introduction

Impatient authors with prior knowledge of LaTeX may want to skip directly to Section 8 to begin using the class file. Really impatient thesis authors who have procrastinated until the night before their defense may want to skip to Section 6

TeX is a markup language designed in 1978 by Donald E. Knuth. TeX is pronounced like "tech" as in TeX-nician. Donald Knuth is famous for writing *The Art of Computer Programming* books [5]. While writing the first volumes of his work he became frustrated by the typesetting mistakes his publishers were making

with his work and with the limited abilities of the *troff* program to produce properly typeset results. This motivated him to write the Turing complete language TEX. The purpose of TEX is to properly handle the minute details associated with properly formatting bits of text and mathematical formulae.

LATEX was written by Leslie Lamport in 1985. LATEX is a collection of macros, written in the language TEX, that allows an author to concentrate on the higher-level document features rather than on the details of typesetting.

TEX and LATEX are far older, more mature and more capable of preparing professional technical documents than Microsoft Word, WordPerfect or any other inferior graphical applications.

1.1 Disadvantages of using TEX/LATEX

Using TEX and LATEX is not without disadvantages:

- Documents are stored as plain 7-bit ASCII text and will need to be compiled into a `.dvi`, `.ps` or `.pdf` file in order to view the typeset results.

  Instructions on how to do so are provided in this documentation.

- The editing of documents is done through any ASCII text editor and not through a "What You See Is What You Get" (WYSIWYG) graphical application.

  This allows an author to choose what ever editor and environment with which he is most productive.

- To include graphics into LATEX documents the graphics need to be supplied as Encapsulated PostScript images.

- The author needs to learn a new markup language.

  The core amount of information that is required though fits in the first 40 pages of Lamport's informative book LaTeX: A Document Preparation System [6].

- Limited typeface capability. Switching typefaces is not as easy. This is due to TEX being developed at a time when PostScript and TrueType typeface technologies were not available. This limitation has been corrected and TEX can use TrueType typefaces, but it has to be setup properly and to do so is not a trivial undertaking.

1.2 Advantages of using TEX/LATEX

The presence of these disadvantages raises the question "Why use LATEX 2_ε?"

- It is free. You can obtain TEX and LATEX 2_ε without cost for just about any operating system available including Linux, Windows, Mac and even DOS.

- It is free. You can modify the source code to LaTeX 2$_\varepsilon$ and even distribute the derived work under certain, reasonable conditions. If LaTeX 2$_\varepsilon$ doesn't do exactly what you want it to then you can change it so that it does.

  Though, doing so is not always trivial. The `CSUNthesis.dtx` *file is now* $2,857$ *lines and growing just to provide thesis authors with the changes necessary to conform to the thesis guidelines.*

- If you need to format mathematical formulae then LaTeX 2$_\varepsilon$ with the `amsmath` package is unbeatable.

  Open up Microsoft Word's equation editor and try to insert the simple formulae "$B \nrightarrow A$". (Hint: Word doesn't have something as simple as negated arrows.) In LaTeX that formula is typeset by simply typing `$B\nrightarrow A$`.

  A quick survey of Word's equation editor reveals that Word provides the author with a total of 286 different symbols or relationships; LaTeX 2$_\varepsilon$ provides an author with over $2,000$ symbols. The common math packages alone provide 576 mathematical symbols (including the $\nrightarrow$ symbol example).

- LaTeX automatically organizes, numbers and builds your *Table of Contents*, *List of Figures*, *List of Illustrations* and *Bibliography* sections.

- Figures, sections, chapters, subsections and equations are all numbered automatically and updated whenever content is reorganized. Cross-references to numbered material are also automatically updated when numbering changes.

- With a decent class file, such as CSUNthesis, all formatting is handled for you automatically.

- LaTeX is always consistent. Spacing between words, lines, paragraphs, itemized or enumerated list items is always the same and labeled consistently.

- with a decent bibliography data file the content and formatting of the bibliography section is always built correctly. The bibliography is automatically sorted, formatted and numbered whenever new citations are added to the document.

- LaTeX produces a document that is generally more professional and ready for publishing than those produced by weaker word processing systems.

- LaTeX is a professional document preparation system, not a word processor.

- LaTeX supports *literate programming*. This means that the source file can be self documenting. Not only can comments be inserted into the source file, but full documentation can be supported. This documentation and the `CSUNthesis.cls` file are generated from the same original LaTeX 2$_\varepsilon$ source file.

The remainder of this document instructs an author on how to use the CSUNthesis class class file to prepare a suitable masters thesis using LaTeX.

2 Academic (Dis)Honesty

This section is present in order to inform students about the standards to which they are required to adhere to when producing an acceptable thesis. If you are reading this document because you chose Prof. Wiegley or Prof. Noga and they are making you do you thesis in LaTeX 2_ε then you should at least be aware that both of these professors, and almost all other professor's on campus, have failed theses for reasons of academic dishonesty.

The first thing to remember is that, above all else, your thesis stands as representing yourself to the world. Your thesis represents the levels of excellence that you are capable of acheiving and the depth to which your knowledge, research and problem solving skills extend. What you produce will be archived forever for the public to view.

Your thesis also reflects on the quality of education and the reputation of CSU Northridge.

It is in nobody's interest to produce a thesis through any form of academic dishonesty. It should consist of your ideas and your analysis of the problem you tackled. The works of others should only be included as evidence to support your conclusions.

The most common form of academic dishonesty is *plagiarism*. Plagiarism is is easy to commit and most students dont' believe they have done anything wrong. Ignorance of the law however is not an excuse. The end result of committing the act will be that you are not allowed to defend.

So what is plagiarism and how do I avoid it?

Plagiarism: "the act of plagiarizing; taking someone's words or ideas as if they were your own"[12]

Plagiarism occurs the moment you cut and paste the published material produced by some other author without the following three criteria:

1. you must have either the author's (or copyright holder's) permission, or the amount and type of work being copied must conform to the rules of fair use.[14]
2. You must cite the full bibliographic information for the work in your references.
3. The item must be used as evidence to support a conclusion stated by you. The item cannot be used as an alternative to writing your ideas up, even you have the same concept to state.

For example, the definition of plagiarism included above has been obtained via fair use rules (it's amount and scope is sufficiently small.) I have also cited where the reference was found and who published it. (It's a URL which are sometimes

hard to find author and date information for, but none the less it is cited.) I used it as an example to demonstrate what it was I was talking about. I did not put forth the notion that I was somehow defining plagiarism myself.

"But somebody has a really great image I want to use and seems a waste of time to build my own." Fine. Ask the author if you can use his image. Most likely if all you want is an image they will happily agree. Once permissions is obtained then you can cite the origin of the image and provide your own analysis about the image or draw conclusions from it.

"But they did some really great work that I want to talk about." Lots of people do lots of great work. It is your responsibility to be one of those people. To this end you should be generating your own, unique, ideas. You ideas can be related to other author's ideas or an outgrowth from them. In which case you can include their work in order to compare, contrast and support their ideas with what you have developed. For instance, take the following excerpt:

> After we came out of the church, we stood talking for some time together of Bishop Berkeley's ingenious sophistry to prove the nonexistence of matter, and that every thing in the universe is merely ideal. I observed, that though we are satisfied his doctrine is not true, it is impossible to refute it. I never shall forget the alacrity with which Johnson answered, striking his foot with mighty force against a large stone, till he rebounded from it – "I refute it thus."

[4] This is one of my favorite quotes and is illustrates an example of an effective and easy method for proving that reality is real and not some illusion present in some nebulous being. There exist other effective arguments as well.

Notice that my point is that there exists argument to prove reality and that there are certain types of quotes that I like better than others. I have not used Mr. Johnson's quote, in place of my own words, to state that reality exists. I used it to back up my own concepts. You can use material in a similar fashion.

"But what I included is freely available on the web." That may be true. The work you are borrowing could be "freely" available for anybody to view but *only* through the means and methods that the publisher or author chose. You do not have the right to expose their ideas through another means.

"But I only borrowed a little bit for the introduction; the rest of the work is all mine." Too bad. If even just one paragraph is plagiarized then the entire work unacceptable. It's sort of like being pregnant... You can't be just a "little" pregnant.

If you have **any** doubts about whether or not an intended course of action would constitute some form of academic dishonesty then you should seek your advisor's advice. They will know what to do and how to achieve the result you are looking for. It's one of the reasons they exist for you.

3 Obtaining LaTeX 2ε

LaTeX 2ε is available for almost every operating system. The method for obtaining and installing LaTeX 2ε is a little different for each operating system. Most authors will be working on a `Linux` or `Microsoft Windows` operating system and the general directions for these two systems are covered in this document.

3.1 Un⋆x

Linux comes in several "flavors" called distributions. *RedHat*, *Debian* and *Slackware* are some of the popular ones. Almost all Linux distributions are packaged based these days, making installation of large applications very easy.

under Debian the command:

```
apt-get install tetex-base tetex-bin tetex-extras
```

will download and install all the necessary programs. Redhat users can install similar RPM packages using tools provided by Redhat.

3.2 Microsoft Windows

Windows users will want to obtain and install the LaTeX 2ε distribution named `MikTeX` [9].

4 Document production

Preparing a document using LaTeX involves iteration of the following steps.

Edit: Edit Source Code. Any `ASCII` text editor is sufficient for this task. Any changes to the document's content are made by editing a source file (or a collection of source files).

Compile: Compile the source file using the command `latex` (and possibly `bibtex`).

Preview: Preview the resulting document using a preview application such as `xdvi` (Un⋆x) or `yap` (Windows).

Print: Convert the document to PostScript or PDF for printing.

(The final review of a document should be performed on the PostScript or PDF version using a viewer such as `xpdf` or Acrobat Reader as `xdvi` and `yap` have some problems rendering PostScript correctly.)

4.1 Editing the document

The source document is the file that the author works on and changes. Traditionally, the extension of the file name is either `.tex` or `.ltx` to reflect the file's purpose. The source file is a simple 7-bit `ASCII` encoded file. Any text editor can be used to create and edit the source file. Common editors include `emacs`, `vi`, `pico`, `nano`, and `notepad`.

To illustrate the remaining procedures for creating the final publishable document from the source file it is helpful to have a sample document to reference. Listing 1 on Page 8 is such a document. Consider this to be the source file named "`example.tex`".

Listing 1: Minimal CSUNthesis document example: `example.tex`

```
\documentclass[12pt]{CSUNthesis}

\submitted{December}{2004}

\author{John Doe}

\title{CSUNthesis Example}

\committee
    {John Q. Public, Ph.D.}
    {Jane Doe, Ph.D.}
    {David Phantom, Ph.D.}

\abstract{This document is a simple example of using the
\textsf{CSUNthesis} class file.}

\begin{document}

\chapter{Introduction}
This document was produced using \LaTeX\ code. The
source for this example represents the minimum amount
of markup commands needed in the preamble to produce
a document using the \textsf{CSUNthesis} class
file.

\end{document}
```

4.2 Compiling the document

As the reader can see, the source file contains no binary formatting. Instead formatting is specified by directives (called *macros*). The `\textsf{...}` is a directive that typesets its argument in sans-serif typeface, a simplified stroke typeface similar to Helvatica.

To produce actual formatted output it is necessary to compile the source file. The program `latex` is the compiler and produces a formatted output file that ends in

the filename suffix of `.dvi`. DVI is an acronym for Device Independent file.

It is easy to compile simple files. The command

```
latex example.tex
```

will compile the file and produce a DVI file as output. The compilation also produces a variety of other auxiliary files which will be discussed in a moment.

Authors should carefully read the debugging output that LaTeX issues while compiling a file. If it encounters any fatal errors it will stop and fail to compile the file and tell the author why. Non-fatal warnings will simply be logged and the compilation will proceed.

The worst warning that can occur that authors **must** be aware of and correct are "`Overfull \hbox`" and "`float too wide`" warnings. TeX uses the concept of boxes to construct the formatted output. Boxes containing individual characters are glued together to make a box containing a word, word boxes are glued together to make line boxes and line boxes are glued together vertically to make pages. An `Overfull \hbox` means that TeX could not find a decent place to break a line and has produced a box that is too wide. This box extends out into the margin area and will result in the result being rejected by the Graduate Evaluator. **Always correct overfull hboxes!** This can usually be done by simply altering the chosen wording for the line. If the line is caused by a float figure being too wide then the figure can be resized smaller to correct the problem. `The Graduate Evaluator will not accept theses that violate the margins!`

4.2.1 Advanced compiling

LaTeX tries to perform its work in a single pass through the document. If references, citations and section numbering is used then this causes some problems. A citation or reference may be encountered before the number is known. So LaTeX is unable to determine the proper value to produce in the output during the first pass.

The problem is solved through the generation of an auxiliary file during the first pass. A second compilation pass is required and fixes up the problem. The auxiliary file ends in a suffix of `.aux`. Other, similar auxiliary files are created to assist with the table of contents, list of figures and list of tables if they are called for.

When LaTeX computes a new number for a figure, section or citation it records the label and number in the auxiliary files. When LaTeX encounters a reference to a figure, section or citation it looks up the label in the auxiliary file and obtains the value recorded earlier or in a previous pass.

The first compilation pass results in a complete and correct auxiliary file but label references may not be correct since the auxiliary file wasn't complete at the start of the pass. Rerunning `latex` a second time will correct all the label references.

The second pass is only necessary if label references have changed. LaTeX is pretty

smart and will issue a warning at the end of a compilation pass if it thinks it needs to be recompiled to get the references corrected. In rare cases a third pass is required.

In general a complete compilation run will consist of the following commands:

```
latex example.tex
bibtex example
latex example.tex
latex example.tex
```

`bibtex` only needs to be run when the bibliographic database changes or when citations are changed in the source document. The BibTeX database and its usage is discussed in Section 4.5.

4.3 Previewing the document

One drawback to the use of LaTeX is its lack of "What you see is what you get" interactive capabilities. After compiling the file most authors will want to preview the formatted output to make sure it is professional and ready for publication.

There are graphical previewers available that can handle DVI files. On Un⋆x like platforms with X-windows, the application called `xdvi` can display the resulting DVI file. Under windows the MikTeX distribution includes an application named `yap` (yet another previewer).

`xdvi` and `yap` both support recognition of a change in the DVI file and redisplay the result. This means that you only have to launch these programs once and then leave them running. Every time the source file is recompiled the already opened previewer will display the new result. (`xdvi` only checks the file when the `xdvi` window is "exposed".)

4.3.1 PostScript preview problems

`xdvi` and `yap` are good, but both seem to have problems previewing certain PostScript features. `xdvi`, for instance, is unable to display landscape rotated pages.

A fool-proof method for previewing documents is to convert the DVI file to PostScript and then use a fully capable PostScript previewing application. Conversion is done using the `dvips` program as described in Section 4.4. `ghostscript` is a powerful PostScript previewer that is free but it is not very user friendly. `gv` (Ghost View) is a user friendly, paged front-end to `ghostscript`. With the proper command line argument `gv` also supports recognizing when the PostScript file changes and updating the display.

4.4 Converting the document for printing

Once the document is complete the author will need to print the document. Modern printers typically communicate using proprietary protocols and print languages and do not recognize DVI formatted material natively. Many printers do understand the PostScript printing language. Adobe produces *Acrobat Reader*, a free Portable Document Format (PDF) viewer that can print PDF files to any printer. PostScript can easily be converted to PDF format.

PostScript makes a good common denominator. The LaTeX packages come with a DVI-to-PostScript converter named `dvips`

Running the command

```
dvips -o example.ps example.dvi
```

will produce a PostScript formatted output file named `example.ps` that is ready for printing or conversion to PDF.

Conversion from DVI directly to PDF is possible using the `dvipdf` tool. However, the author of the CSUNthesis class has had problems with this tool where the resulting format did not match that produced by `dvips`

A better way to produce to produce a PDF version is to use the `ps2pdf`. The command

```
ps2pdf example.ps example.pdf
```

will produce a PDF file named `example.ps` from the PostScript file `example.ps`.

So in conclusion the process is:

$$\text{.tex} \rightarrow \text{.dvi} \rightarrow \text{.ps} \rightarrow \text{.pdf}$$

4.5 Maintaining a bibliographic database

The bibliography is an essential component of any scholarly work. It provides the reader with references to additional, helpful information. It also provides previous authors with recognition for the value of the work that they produced and that the new document has relied on to achieve success. The correctness and format of the bibliography is therefore very important and great attention should be paid to its preparation.

The format of a bibliography is not standard. Some bibliographies are sorted by author's last name, some are sorted by title. Some italicize titles while others place the title in quotes. The bibliographic style is usually dictated by the publisher. Famous styles include the Chicago Manual of Style [7] and Kluwer Academic publishers. With a variety of styles mandated by publishers, authors do not want

to have to re-format their bibliography entries for each document. The problem is made worse by the fact that authors frequently use the same references in different, but related works and don't want to re-enter the information repeatedly.

LaTeX relies on a helper application named BibTeX to automate much of the tedious preparation required for professional bibliography. BibTeX solves these problems by having the author maintain a single, format independent database file of bibliographic information. The author maintains a single, separate `ASCII` file that ends in a filename suffix of `.bib`. This document assumes that the filename is `authors.bib`.

Publications are listed in the `bib` file as specially formatted entries (but a standard format that supports all bibliographic styles in an independent manner). Listing 2 illustrates the two entries used to provide the Lamport [6] and Chicago Manual Of Style [7] references.

Listing 2: BibTeX database entry examples

```
@Book{lamport94:_latex,
  author =       {Lamport, Leslie},
  title =        {LaTeX: A Document Preparation System},
  edition =      {third},
  publisher =    {Addison-Wesley, Professional},
  ISBN =         0201529831,
  month =        jun,
  year =         1994
}

@Misc{url:miktex,
  title =        {{MikTeX}},
  howpublished = {\url{http://www.miktex.org/}},
}

@Book{chicago03:_chicag_manual_style,
  author =       {University of Chicago Press Staff},
  title =        {The Chicago Manual of Style},
  publisher =    {University of Chicago Press},
  edition =      {$15^{th}$},
  ISBN =         0226104036,
  month =        aug,
  year =         2003,
  pages =        984
}
```

Once the bibliographic database is maintained it needs to be incorporated into the compilation procedure. Whenever the `.bib` file is changed or if citations in the document are added or removed then BibTeX needs to be rerun on the auxiliary file. If LaTeX complains about "undefined references" then run the command

```
bibtex example
```

and then rerun the `latex` compiler until there are no cross-reference warnings.

Various websites [13, 11, 3] can provide the author with more information and tutorials on using BibTeX.

5 Tips and tricks

5.1 Source code listings

In the discipline of computer science it is frequently necessary to illustrate source code. Carsten Heinz has written a very excellent package called `listings.sty` [2] for typesetting source code into LaTeX documents. Authors should refer to the PDF documentation available at the given URL for usage of this package.

Authors should avoid cutting and pasting code into their thesis. Instead, use the `\lstinputlisting` command from the `listings.sty` package to obtain the desired portion from an external file. This way if the source file changes, so does the thesis, thereby maintaining accuracy.

6 Templates

The effort and experience required to modify LaTeX to conform to the guidelines is rather extensive (nearly a thousand lines of LaTeX code). This may make understanding the reference section rather overwhelming for the beginner. To make that learning curve easier the following subsections present basic templates for proposals and thesis creation.

6.1 The minimum requirements for a proposal

Graduate students begin with a proposal. The following shows example LaTeX code used to create an acceptable proposal. Proposal format requirements are not as rigid as thesis requirements and are not subject to the approval of the Graduate Evaluator. The example sections in the proposal templates have been fleshed out with a description of the content graduate students should include in their proposal.

Listing 3: Proposal document example

```
1 \documentclass[proposal]{CSUNthesis}
2
3 \title{Minimum Proposal Example}
4
5 \author{John Q. Public}
6 \contact{jpublic@csun.edu}
7
8 \committee{Jane Q. Vicktumb, Ph.D}
9           {Robert Victem, Ph.D}
```

```
            {Ignacious Viktom, Ph.D}

\coordinator{Richard O. Sight, Ph.D}

\begin{document}

  \section{OBJECTIVE}

  A short statement describing the primary objective
  of the proposed work. Shoot for no more than five
  sentences.

  \section{INTRODUCTION}

  Introduce the reader to the area in which you will
  be working. This includes basic definitions and
  explanations geared toward an intelligent
  undergraduate computer science student who has never
  been exposed to your area of work. Proceed to
  describe what sort of work has already been done and
  exactly what you propose to do, going into as much
  detail as possible. Indicate the technical importance
  and/or interest of your proposed work. In discussing
  previous work you should cite references gathered in
  a literature search including critiques and summaries
  of the references read and cited.

  \section{TECHNICAL APPROACH}

  Describe your approach to your work. For example,
  describe any special machinery you will be using, the
  design methods you plan to employ, insights you have
  into potential new algorithms, etc. Produce a work
  breakdown structure, listing the major tasks and
  sub-tasks of the proposed project or thesis.

  \section{SCHEDULE}

  Provide a Gantt chart or similar device showing the
  start and completion dates of the tasks and sub-tasks
  described in the work breakdown structure.

  \section{CRITERIA FOR SUCCESS}

  Establish a set of criteria that can be used to
  evaluate the degree of success of your proposed work.
  For example, how much faster will your new algorithm
  be than existing algorithms?  What level of skill
  will your go playing program achieve?  How closely
  will your simulator model the item being simulated
  and how efficient will the simulation be?  It should
  be possible to make an objective evaluation of your
  completed work using the criteria you set down.

```

```
64    \references{plain}{references}
65
66  \end{document}
```

6.2 Minimum Thesis example

The same CSUNthesis class that was used to create the proposal is also used to create the full thesis. (Actually the class file's purpose is to create theses; the proposal format creation was added as a convenience. Proposals use only a small subset of the features provided by the class.)

The biggest difference is the absence of `proposal` from the document class options.

A template is presented here for illustrating the minimum macros requires for producing a thesis using the class file.

Listing 4: Proposal document example

```
1  \documentclass{CSUNthesis}
2
3  \title{A Minimum Thesis Example}
4
5  \author{John Q. Public}
6
7  \submitted{May}{2005}
8
9  \committee{Jane Q. Vicktumb, Ph.D}
10           {Robert Victem, Ph.D}
11           {Ignacious Viktom, Ph.D}
12
13 \abstract{This document in the result of a minimal
14           \textsf{CSUNthesis} thesis document.}
15
16 \begin{document}
17
18   \chapter{Introduction}
19
20   Authors can use the minimum thesis template as a
21   starting point for creating their CSU Northridge,
22   masters thesis using \LaTeX\ and the
23   \textsf{CSUNthesis} class. The class file
24   automatically satisfies almost all of the
25   requirements as set forth in the ``Guidelines for
26   the preparation of theses, graduate projects and
27   artistic abstracts.''
28
29   Authors who wish to use the more advanced features
30   of the \textsf{CSUNthesis} class should refer to
31   the advanced template instead.
32
33 \references{plain}{references}
34
```

```
\end{document}
```

6.3 A Maximum Thesis Example

Most authors will want to produce a thesis that consists of more than the minimum features. This example illustrates almost all of the features made possible by the CSUNthesis class (including the inclusion of source documentation).

Listing 5: Proposal document example

```
\documentclass[10pt,lof,lot,lol]{CSUNthesis}

%most CS students will want to present code listings.
\usepackage{listings}

%most authors will want to include graphics
\usepackage{graphicx}

\title{A Maximum Thesis Example}

\author{John Q. Public}

\submitted{May}{2005}

\committee{Jane Q. Vicktumb, Ph.D}
          {Robert Victem, Ph.D}
          {Ignacious Viktom, Ph.D}

\abstract{This document in the result of a maximal
          \textsf{CSUNthesis} thesis document.}

% There is more to life than computers
\degree{Master of Science}{Psychology}

%various front matter pages, the absence of any of these
%macros just causes an absence of those pages.

%information for producing a defense announcement page
%comment out to supress announcement page.
\defense{Monday}{May $14^\textrm{th}$}{3:30PM}{EA1440}

%Cause a copyright page to appear after the title page.
\copyrightyear{2005}

\dedication{This template is dedicated to the brave,
            pioneering students who choose to produce
            their thesis using \LaTeX.}

\acknowledgement{Special thanks to Joohwan Lee, Amy
                 Snetzler and Joel Iniguez for pointing
                 out all the mistakes present in the
                 \textsf{CSUNthesis} class file and for
```

```
                  their continued pressure to make the
                  class file perfekt and well documented.}

\preface{Authors may want to describe, or inform the
         reader of something special prior to
         presenting the thesis material.}

\collaboration{Jimmy Anonymous}

\begin{document}

\chapter{Introduction}
  This is an example including most of the features
  students may want to use in their thesis.

\section{First section}
  Authors will want to research the following \LaTeX\
  environments for producing certain formats:
  \begin{itemize}
  \item \verb|\begin{itemize}| and
    \verb|\begin{enumerate}| for producing bulleted and
    enumerated lists (like this one).
  \item \verb|\begin{figure}| and
    \verb|\begin{tabular}| for making figure and tabular
     environments.
  \item \verb|\chapter|, \verb|\section|,
    \verb|\subsection| and \verb|\subsubsection| for
    sectioning their work.
  \item \verb|\begin{center}| for centering their
     figures and tables.
  \end{itemize}

\section{Some other goodies}
  Authors may want to change typefaces every now and
  then to provide contextual information through the
  use of typographical conventions.
  \begin{itemize}
  \item \verb|\texttt{desired text}| yields a
    \texttt{fixed-width}, Courier-like typeface. Good
    for use in writing out \texttt{method()} names,
    code examples and \texttt{filenames}.
  \item \verb|\emph{desired text}| produces
    \emph{italics}. Good for introducing new
    terminology. The vocabulary chosen to represent
    something is called \emph{nomenclature}.
  \item \verb|\textbf{desired text}| produces
    \textbf{bold face}. Good for adding stength to a
    portion of a statement. It \textbf{should} be used
    carefully.
  \item \verb|\textsf{desired text}| produces a
    \textsf{sans-serif} typeface which is possibly good
    for other typographical conventions. This document
    uses sans-serif when referring to \LaTeX\ packages
    such as \textsf{CSUNthesis}; though it
```

```
97      should be \texttt{CSUNthesis.cls} when referring to
98      the actual filename, and \textsf{CSUNthesis} when
99      referring to the class in general.
100   \end{itemize}
101
102 %references come before appendicies.
103 \references{plain}{references}
104
105 \appendix % switch chapters to be appendicies
106
107 \chapter{First appendix}
108
109 \chapter{Last appendix}
110
111 \end{document}
```

Since the example maximum template has a lot of hints provided in the example sections it might be beneficial to also provide the reader with the resulting format that would be produced by those sections to make it easier to read and digest and to see the product of the markup macros.

`\section{First section}`
Authors will want to research the following LaTeX environments for producing certain formats:

- `\begin{itemize}` and `\begin{enumerate}` for producing bulleted and enumerated lists (like this one).
- `\begin{figure}` and `\begin{tabular}` for making figure and tabular environments.
- `\chapter`, `\section`, `\subsection` and `\subsubsection` for sectioning their work.
- `\begin{center}` for centering their figures and tables.

`\section{Some other goodies}`
Authors may want to change typefaces every now and then to provide contextual information through the use of typographical conventions.

- `\texttt{desired text}` yields a `fixed-width`, Courier-like typeface. Good for use in writing out `method()` names, code examples and `filenames`.
- `\emph{desired text}` produces *italics*. Good for introducing new terminology. The vocabulary chosen to represent something is called *nomenclature*.
- `\textbf{desired text}` produces **bold face**. Good for adding stength to a portion of a statement. It **should** be used carefully.
- `\textsf{desired text}` produces a sans-serif typeface which is possibly good for other typographical conventions. This document uses sans-serif when referring to LaTeX packages such as CSUNthesis; though it should be `CSUNthesis.cls` when referring to the actual filename, and CSUNthesis when referring to the class in general.

7 Writing guidelines/FAQ

7.1 The written vs spoken language

We learn to speak before we learn to read or write. While almost adults become fluent in a language there are great many that remain illiterate. Once we learn how to speak and understand what is spoken why can't we automatically read and write? There are least two reasons:

1. Reading and writing require the additional ability of recognizing and producing visual symbols.
2. Speech is produced in real time and is continuous.

The more important point is item 2. Speech is produced in real time and can be continuous. Any misunderstandings or omissions can be corrected and clarified by augmenting and continuing the spoken dialog. Written documents, on the other hand, are produced once and become a permanent, static transfer of knowledge. It is not possible to interact with the reader and make clarifications or corrections once the document has been published. It is therefore much harder to write than it is to speak because much more effort must be spent planning, designing and organizing the information that the author wishes to publishes so that corrections and clarifications are not required for readers to understand.

Must students, and many authors, ignore how important this is. When writing you must be very specific, very consistent and very accurate. How long does it take to write a thesis? Well, for the first draft ten pages per day is rather easy. So why doesn't it take one week to write a thesis? Because the editing and organization to take a draft copy to final publication is 90% of the effort. You can expect to spend nine times as much time editing your document as it took to include the majority of the content.

7.2 Providing examples

One failing that many authors make is the overuse of the abbreviation *etc.* to indicate to the reader that a list of examples is not exhaustive. When speaking a list of examples to an audience you may find that in retrospective you need to indicate that the list is non-exhaustive. One can either add a phrase such as "or other things such as those I have already mentioned", or to make the converstation shorter simple say "etcetera."

In writing however it is a rather lazy method of indicating a non-exhaustive list and indicates that the author has not taken the time necessary to properly organize his work. There is almost always a more professional alternative, in terms of grammar, that eliminates the need for this latin abbreviation and makes the reading pleasant.

"There are many types of types of atoms. Cesium, Iron, Mercury, etc. to name a few" should be replaced by *"There are many types of atoms such as Cesium, Iron or Mercury."* Thereby avoiding the use of etcetera. An equally suitable alternative is *"There are many types of atoms including Cesium, Iron and Mercury."* (Note the switch to *and* instead of *or* which is logically important.)

Avoid the use of the word "like" when providing examples. The word like either indicates a preference, as used in "I like ice cream", or indicates direct comparison, as used in "The cat rose up on its hind legs like an angry bear." The cat is acting like a bear but the bear is not an example of a cat.

7.3 Don't dictate commands to the reader

Many thesis writers are inclined to describe the implementation of their work as a tutorial which leads the reader through the creation or use of their project. A

thesis is a publication of knowledge and concepts learned; it is not a usage tutorial.

Avoid, at all costs, commanding wording such as: "Create a new APS.NET web application and rename the default file WebForm1.aspx to ItemInfo.aspx" citethesis:nmathews. In doing so, you have commanded the reader to perform an action that they cannot possibly complete. The thesis presently in their hand is made of paper and is not a computer. It does not have the capability of allowing the reader to create a new web application nor does it contain a filesystem. Maybe, someday in the future, this will change but for now stick to providing the reader with digestible information and avoid telling them to do something.

In general, writing a sequence of actions to perform to complete a task makes for some of the worst, most boring, reading when formatted as a narrative paragraph. If you must provide such information then provide it as an enumerated list where each item represents a single step. For instance, The steps a user would need to recreate the web appliction presented in this section consists of:

1. Using the IDE to create a new ASP.NET web application.
2. renaming the default file, "WebForm1.aspx", to "ItemInfo.aspx".
3. ...

If you need to do this frequently in your thesis then you should first pick up an automotive factory service manual and see how professional procedural tutorials are written. First, you should probably consider that you are actually not writing a thesis but are instead writing an automotive service manual.

7.4 Consistency

Writing is an art. Like fine art, any brush stroke that inconsistent, or contrary, to the other strokes diminishes the quality of the work. Even a single wrong stroke can utterly destroy the beauty of the work.

In writing one must be very careful to be consistent. There are many styles and formats to choose from.

7.4.1 Paragraph indentation and spacing

The indentation of paragraphs and the spacing between paragraphs is a choice made by the author. Here are some possibilities:

- Indent the first line of every paragraph, No spacing between paragraphs. (The beginning of a paragraph is easy to locate by it's indented line.)
- Paragraphs are not indented but spacing is added between paragraphs. (The beginning of a paragraph is easy to locate by the separation between paragraphs.)

- The first line of every paragraph (except the first paragraph of any chapter, section or subsection) is indented and spacing is added between paragraphs. (The beginning of a paragraph is easy to locate by the separation between paragraphs. Indentation is not necessary for the first paragraph because it can quickly be recognized because it follows a sectioning break.)

So which do you choose? It doesn't matter as long as you are perfectly consistent with its usage throughout the entire document.

7.4.2 Typographical conventions

Words, syntax and grammar are only some of the tools available to a writer to convey content. Sometimes these alone are not enough to convey the proper content to a reader or may become confusing without additional verbage or tools.

Take, for example, the following discussion of source code:

> We did this to increment the variable classification by four.

Does the author mean that there is a classification of variables and that they are promoting the topic to a higher classification? No. In this case the author is talking about a variable named "classification." How can we clarify this for the reader? The most obvious method is to add wording or syntax to the phrase:

> We did this to increment the variable named "classification" by four.

However, the use of double quotes is well established in writing to indicate either a direct quote of somebody else, to indicate that dialog between characters is occuring, or to indicate that the reader should consider a non-obvious connotation for a word. They should not be used to indicate a different context for word.

See, you actually already knew about some well established and ubiquitous typographical conventions. You probably just didn't know that they were just part of a larger family or that you get to choose what the conventions are.

There are much better ways to provide contextual information for a word or phrase and these methods are termed *typographical conventions*. (Notice that quotes were not used to provide the context that typographical conventions is a new phrase used to describe the class of concepts being introduced in this section.)

Typographical conventions consist of assigning specific typefaces to represent additional context.

Emphasis is frequently used to indicate that a term is being introduced or defined.

`Monospacing` is frequently used to indicate that source code or computerized information is being presented. So the best way to rework the above example is:

We did this to increment the variable `classification` by four.

This makes it shorter for the reader who is, presumably, use to encountering this convention while reading your document.

Sans-serif is another style that can be used to indicate context. For computer science it can be used to indicate class names or applications.

Small caps can also be used for another context. It is rather like SHOUTING however, so it should be used for a context that is only needed infrequently.

Bold face can be used to distinguish user input from output suppied by the system in response to the user's interaction.

underline is another example. Though it, like bold face, is frequently used to indicate specific importance of a word or concept.

When choosing your typographic conventions it is important to:

1. Choose carefully. Avoid choosing a convention that could lead to the reader having to guess between contexts. (Bold face for code for example could make it difficult for the reader because they might not be able to tell if you are illustrating a variable name or an important word.)
2. Choose wisely. Try to choose conventions to match that which the reader might already be familiar with. For example, almost all program code editors and terminals display source code using a monospaced font such as `Courier`. When presenting code the reader you should also pick `Courier` to present your code samples so that reader encounters a familiar and friendly environment in which to read. To professional programmers source code looks absolutely hideous when presented in a proportional font where columns do not necessarily line up.
3. Be thoroughly consistent. Never fail to use a convention that you have decided on and never use the convention for another purpose where that purpose could be confusing or where the convention's meaning could not be easily deduced from the surrounding context.
4. Define your choice. Unless your selection is trivial or common, you should provide the reader with a preface section to your work that defines and illustrates what your conventions are. This is especially important if your conventions are non-traditional. Nearly every O'Reilly publication from their famous set of technical reference books includes such a preface section titled "Conventions used in this book."

Some other typographical conventions include:

- Special formatting. Large quotes are indicated by increased left and right margins to produce a block quote.

- Increased indenting can be used to offset code or printouts from the main body. (Though it should still be in a monospaced typeface.)
- Marginal icons can be used! (Though its use here is a bit erroneous since there is nothing dangerous about this item unless you are reading this while operating heavy machinery.)

7.5 Quick tips

- **etc.** ends a list as though it were another item. It is always preceded by a comma. (Though maybe you should avoid is entirely.)

  ✔ He could dance, sing, fly, etc.

  ✘ He could dance, sing, fly etc.

  (Notice that the complete absence of *etc.* in this case is perfectly acceptable as well and would simplify the wording without loss of content or meaning.)

- **etc.** is an abbreviation of the word "etcetera". Abbreviations are terminated with a period to indicate the absent letters.

  ✔ He could dance, sing, fly, etc.

  ✘ He could dance, sing, fly, etc

- ", ", ', and ': Quotes are like parenthesis, there are opening quotes and closing quotes that are distinct. Don't use " unless it is in a code sample.

  Opening single quote ‘ is produced in LaTeX 2ε with a single backtick (most probably the keyboard key to the left of the digit 1.)

  Closing single quote ’ is produced in LaTeX 2ε with a single quote (most probably the keyboard key to the left of the enter key.)

  Opening double quotes “ is produced in LaTeX 2ε with two consecutive backticks.

  Closing double quotes ” is produced in LaTeX 2ε with two single quotes.

  Raw double quote character
  fbox" is produced in LaTeX 2ε inside of verbatim environments by the usual double quote key stroke.

- When possible, compose you sentences and statements using positive, rather than negative, tense.

  ✔ "The tight binding of languages to hardware and operating platforms makes the problem more difficult."

  ✘ "The tight binding of languages to hardware and operating platforms never made it easier." [1]

  Basically, the fewer negations you have in a sentence the easier it is for the reader to figure out what you meant.

- Similarly, mathematical theorems should be stated as a concise, provably false statement.
  - ✔ The lower bound for μ is $\frac{sqrt6}{2}$.
  - ✘ It can be show that the lower bound for μ is $\frac{sqrt6}{2}$.

8 Reference guide

The reference guide section explains, in detail, all of the various document options and macors that a thesis author may wish to use

8.1 How to read the reference

Commands, keys and environments are presented as follows.

hints `command`, `environment` or `key` with ⟨*parameters*⟩ `default`

This field contains the explanation; here we describe the other fields.

If present, the label in the left margin provides extra information: '*addon*' indicates additionally introduced functionality, '*changed*' a modified key, '*data*' a command just containing data (which is therefore adjustable via `\renewcommand`), and so on. Some keys and functionality are '*bug*'-marked or with a †-sign. These features might change in future or could be removed, so use them with care.

If there is verbatim text touching the right margin, it is the predefined value.

The label in the right margin is the current version number and marks newly introduced features.

Regarding the parameters, please keep in mind the following:

1. A list always means a comma separated list. You must put braces around such a list. Otherwise you'll get in trouble with the `keyval` package; it complains about an undefined key.
2. You must put parameter braces around the whole value of a key if you use an `[`⟨*optional argument*⟩`]` of a key inside an optional `[`⟨*key=value list*⟩`]`: `\begin{lstlisting}[caption={[one]two}]`.
3. Brackets '`[ ]`' usually enclose optional arguments and must be typed in verbatim. Normal brackets '[ ]' always indicate an optional argument and must not be typed in. Thus `[*]` must be typed in exactly as is, but [*] just gets * if you use this argument.
4. A vertical rule indicates an alternative, e.g. ⟨*true*|*false*⟩ allows either `true` or `false` as arguments.

5. If you want to enter one of the special characters `{}#%\`, this character must be escaped with a backslash. This means that you must write `\}` for the single character 'right brace'—but of course not for the closing parameter character.

8.2 CSUNthesis class file usage

The usage of the CSUNthesis class file is broken into three distinct sections.

1. Document options. These are values that can be passed as options to the `\documentclass[...]{CSUNthesis}` line. These options control very high level document formats such as typeface size or draft/final options.
2. Required preamble commands. These commands must be present for the thesis source file to compile.
3. Optional preamble commands. These commands provide additional, or optional, features.

The preamble section of the source files is the top of the source file prior to the `\begin{document}` command. This is where all of the class commands (except for `\references`) are given. Order of the commands in the preamble generally does not matter. Beyond the beginning of the document an author simply uses any TEX or LATEX commands he wishes to use in order to produce the desired publication.

The author uses the `\references` command at the point in his document where the bibiliography is expected to appear. This is always just before the first appendix, or at the very end of the document if no appendicies are included.

8.3 Document class options

The first non-comment line of a LATEXdocument is always the `\documentclass` command. Its full syntax is

`\documentclass[`$opt_1, opt_2, opt_3, \ldots, opt_n$`]{CSUNthesis}`

The bracketed part is optional and allows an author to change certain document options such as default point size. It also allows an author to change certain aspects of his thesis. The following options are available:

⟨ `draft` | `draftcls` | `final` ⟩ `final`

Publications go through numerous proof-reading and rewriting iterations before they are ready to be published. During proof-reading it is convenient

to have a larger baseline skip (inter-line spacing) so that corrections can be marked manually with red ink easily.

Specifying `final` (which is the default) will format the document with normal baseline skip (single spacing).

Specifying `draft` or `draftcls` will increase the baseline skip to 150% allowing for easy insertion of manual corrections. `draft` affects the underlying *report* document style while `draftcls` will only affect items defined by the CSUNthesis class. Most authors will only want to use `draftcls`.

⟨ `10pt` | `11pt` | `12pt` ⟩ `12pt`

Selects the normal typeface size for the document.

Most authors at CSU Northridge will want the default of 12pt; but 10pt is acceptable too.

⟨ `thesis` | `project` | `abstract` ⟩ `thesis`

Specify one of these options to select the type of thesis. This will change the title page to use the appropriate wording.

`thesis`: Works of an intellectual nature that develops and investigates new scholarly information.

`project`: Works of a project nature where the effort results in a functional product based on known information.

`abstract`: Works of a nature that defy textual publication such as theatre performances or artistic exhibits.

⟨ `lot` | `nolot` ⟩ `nolot`

Publications that make heavy use of tabular materials and references to them should have a *list of tables* in the front matter. Specifying `lot` will cause such a list to be built and inserted after the table of contents.

⟨ `lof` | `nolof` ⟩ `nolof`

Publications that make heavy use of figures and references to them should have a *list of figures* in the front matter. Specifying `lof` will cause such a list to be built and inserted after the table of contents and the list of tables.

⟨ `lol` | `nolol` ⟩ `nolol`

Publications that make heavy use of source code listings and references to them should have a *list of listings* in the front matter. Specifying `lol` will cause such a list to be built and inserted after the table of contents, the list of tables and list of figures.

Authors that specify the `lol` option **must** include `\usepackage{listings}` in their thesis so that the listings package [2] `listings.sty` will be available when the list of listings is built.

⟨ `proposal` ⟩

The presence of the `proposal` document option causes a radical change in the format of the thesis. The result is a much simpler and informal format suitable for presenting a proposal to the graduate coordinator of Computer Science.

Front matter is no longer produced, section numbering is changed and a proposal title page with signature entries suitable for a proposal is created.

Applicability of the proposal format for other departments should be checked with the graduate coordinator of the intended department before proceeding.

8.4 Required preamble commands

The following commands must be present and appear prior to `\begin{document}`. The order that they appear does not matter.

8.4.1 Items mandatory for all documents

required `\author {`⟨*author–name*⟩`}`

Specifies the primary author's name. This affects the authorship material present on the title, copyright, signature and abstract pages.

(If necessary, see `\collaboration` for multiple authors.)

required `\committee {`⟨*chair member*⟩`}{`⟨2^{nd} *member*⟩`}{`⟨3^{rd} *member*⟩`}`

the `\committee` command is used to specify the proper names of the committee members. The three names given to the command will appear on the signature in the proper order. The first name is that of the committee chair. the suffix ", chair" will be automatically appended to the name given for the signature page.

required `\title {`⟨*title of work*⟩`}`

Specifies the title of the work. This affects the signature and abstract pages.

8.4.2 Additional mandatory item only for proposals

(proposal) required `\coordinator {`⟨*coordinator–name*⟩`}`

Computer Science graduate students must first submit a proposal of their thesis topic. The proposal requires the graduate coordinator's signature. The `\coordinator` command serves to specify the graduate coordinator's name when producing a proposal.

8.4.3 Addtional mandatory items only for theses

(thesis) required `\submitted {`⟨*month*⟩`}{`⟨*year*⟩`}`

Specifies the month and year that the work is submitted to the graduate evaluator.

(thesis) required `\abstract {`⟨*abstract material*⟩`}`

Dictates the body of the abstract on the abstract page. The header of the abstract page is created automatically and the material specified with the `\abstract` command appears beneath the generated header.

8.5 Optional preamble commands

optional `\degree {`⟨*degree*⟩`}{`⟨*department*⟩`}`

The `\degree` command provides the author with the ability to specify a degree objective and department of discipline other than "Master of Science" in "Computer Science", which is the default since the CSUNthesis class was originally written for Computer Science graduate students.

optional `\defense {`⟨*dayname*⟩`}{`⟨*date*⟩`}{`⟨*time*⟩`}{`⟨*location*⟩`}`

Students must submit an announcement page to the department of Computer Science prior to their defense. The page is posted in display cabinets to inform colleagues of the event time and place.

The presence of the `\defense` command causes an appropriate announcement page to appear prior to the title page. To suppress the announcement page simply comment out the `\defense` command or omit it entirely.

dayname: The day of the week the defense is being held.
⟨*Monday*| *Tuesday*| *Wednesday* | *Thursday*|*Friday*⟩.

date: Formal date the defense is being held. Such as *December* 3^{rd}.

time: Time the defense is being held. Such as *3:30PM*.

location: Location the defense is being held. Such as *EA1440*.

optional `\copyrightyear {`⟨*year*⟩`}`

It is acceptable to copyright the work produced. Using the `\copyrightyear` command with a year will cause a copyright front matter page to be inserted after the title page and prior to the signature page.

optional `\dedication {`⟨*text*⟩`}`

Authors may wish to dedicate the published work to special people. Including a `\dedication` command will cause the text argument to be formatted as a dedication page and included in the front matter.

optional `\preface {`⟨*text*⟩`}`

Authors may wish to include a preface to the main body of the work. Including a `\preface` command will cause the text argument to be formatted as a preface and included in the front matter.

optional `\acknowledgement {`⟨*text*⟩`}`

Authors may wish to acknowledge additional people for supporting their work. Including an `\acknowledgement` command will cause the text argument to be formatted as an acknowledgement page and included in the front matter.

optional `\contact {`⟨*contact–info*⟩`}`

On the proposal title page it is polite to provide contact information such as an e-mail address so that committee members can contact the author if they need to.

The `\contact` command is used to specify the contact content for the proposal title page. When printing a formal thesis the contact information, if specified, is suppressed from the title page.

optional `\collaboration {`⟨*coauthor–name*⟩`}`

On rare occasions a thesis is produced through collaboration. To identify a second author on the title page the command `\collaboration` can be used to specify the second author.

necessary `\references {`⟨*style*⟩`}{`⟨*file*⟩`}`

A bibliography is generated at the point in the document where the author issues the `\references` macro. The first argument, *style*, is the style to be passed internally to LaTeX's `\bibliographicstyle` command. The second argument, *file*, is the name of the author's bibliography database file without the "`.bib`" suffix. The file argument is passed internally to LaTeX's `\bibliography` command. This macro also causes an entry to be inserted into the table of contents as to the presence and location of the references section.

9 Implementation

The material in Section 9, Pages 30–57 is the actual LaTeX 2_ε implementation of the CSUNthesis class. It is present for completeness and to encourage continued development. It is not necessary for thesis authors to review or understand such material.

In fact for beginners it can be overwhelming and really scary. An interesting fact is that this documentation and the CSUNthesis class are maintained as the exact

same file (CSUNthesis.dtx). Compiling the .dtx file with latex produces the .cls (class) and the .dvi (documentation) file. So it is impossible to omit the scary, but very useful, information presented here in Section 9 as doing so would remove it from the class file as well!

The other advantage to this section is that it is the actual LaTeX 2_ε code that is present in the class file. So adventurous authors can learn how the CSUNthesis class file was engineered and can even change it to suit their specific needs. (The original author of the CSUNthesis class **highly** recommends that changes be suggested to him or back-ported so that future students can benefit from continued refinement and development.

Identification Print information during compilation to indicate what version of the CSUNthesis.cls file was found and loaded.

```
\typeout{-- CSUN Thesis style} \typeout{-- Author: Wiegley, Jeff,
jeffw@csun.edu}
```

Request that mistakes be reported so they may be corrected for all students.

```
\typeout{--   Please contact the author to have any mistakes corrected.}
```

Typeface Graduate evaluator demands Times New Roman. They shouldn't; but they do. To conform to this we use the times package and we execute a few work arounds to get math mode looking similar. (It may make \texttt{} look strange because that is an entirely typeface family than Times New

```
\usepackage{times}
% \iffalse meta-comment
% Do not use mathptm because:
%  - \boldmath produces non-italic characters
%  - \boldmath seems ultra-fragile, usage in redifining sectioning
%    macros produces non-bold behavior.
% \usepackage{mathptm}
% Do not use mathptm because:
%  - mathtime has no bold support
% We should use mathtime with mtbold option BUT it doesn't map
% characters properly and everything is just plain screw up.
% one area that latex *sucks* at is providing font options.
% And YES I do know about installing postscript fonts and all that jazz but:
%   A) I shouldn't have to know this crap to select a font.
%   B) Not all distributions have a decent set of fonts pre-installed
%   C) Fonts aren't free.
%   D) There's no way a new student/author will be able to figure it out
% \usepackage[mtbold]{mathtime}
% \fi
```

Custom lengths The title on the title page is typeset in a minipage of width \titlewidth. This

prevents ugly, wide titles from being produced.

```
\newlength{\titlewidth}
\setlength{\titlewidth}{4.5in}
```

Some of the front matter pages have their material start further down the page. `\frontmattertopmargin` controls the amount of additional space to add to the normal top margin for these pages.

```
\newlength{\frontmattertopmargin}
\setlength{\frontmattertopmargin}{1.0in}
```

`Conditionals` Several conditionals are need to keep track of format specifications and control the final output.

`\ifproposal` controls the formality of the document.

```
\newif\ifproposal\proposalfalse
```

one of `\ifthesis`, `\ifproject`, or `\ifabstract` gets set to true and controls wording in the front matter based on the presence of the document options `thesis`, `project` or `abstract`.

```
\newif\ifthesis\thesisfalse
\newif\ifabstract\abstractfalse
\newif\ifproject\projectfalse
```

`\iflof`, `\iflot` and `\iflol` control whether or not the front matter includes a list of figures, list of tables and a list of listings, respectively. All default to false. If the author supplies the `lol` option then the `listings` package will automatically be included.

```
\newif\iflof\loffalse
\newif\iflot\lotfalse
\newif\iflol\lotfalse
```

`\ifdraft` controls whether the baseline skip is 100% (false) or 150% (true) of normal.

```
\newif\ifdraft\draftfalse
```

`\ifsizespec` maintains whether or not a typesize option has been specified.

```
\newif\ifsizespec\sizespecfalse
```

`\ifmadebib` maintains whether or not the bibliography chapter has already been produced.

```
\newif\ifmadebib\madebibfalse
```

Illegal options This class bases its format on the `report` style. Several options available to the `report` style make no sense in the context of a CSU Northridge thesis. The following declarations cause class errors if such options are present. This action effectively disables the possibility of successfully using any of the listed options.

twocolumn Two column format is standard in many conference proceedings but are not allowed by the CSU Northridge graduate evaluator.

```
\DeclareOption{twocolumn}{
  \OptionNotUsed
  \ClassError{CSUNthesis}{only single column documents allowed}{}
}
```

twosided Thesis need to be submitted in a format suitable for photo typesetting. This requires that the document be single sided.

```
\DeclareOption{twosided}{
  \OptionNotUsed
  \ClassError{CSUNthesis}{only single sided publications allowed}{}
}
```

8pt Thesis are allowed to be 10 or 12 points. Typeface sizes of 8 points are also too small to meet the requirements of the graduate evaluator.

```
\DeclareOption{8pt}{
  \OptionNotUsed
  \ClassError{CSUNthesis}{only 10pt or 12pt typeface allowed}{}
}
```

9pt Thesis are allowed to be 10 or 12 points. Typeface sizes of 9 points are too small to meet the requirements of the graduate evaluator.

```
\DeclareOption{9pt}{
  \OptionNotUsed
  \ClassError{CSUNthesis}{only 10pt or 12pt typeface allowed}{}
}
```

10pt Specifies that the thesis should be typeset in 10 point typeface family.

```
\DeclareOption{10pt}{
  \sizespectrue
  \PassOptionsToClass{\CurrentOption}{report}
}
```

`11pt` Specifies that the thesis should be typeset in 11 point typeface family.

```
\DeclareOption{11pt}{
  \sizespectrue
  \PassOptionsToClass{\CurrentOption}{report}
}
```

`12pt` Specifies that the thesis should be typeset in 12 point typeface family.

```
\DeclareOption{12pt}{
  \sizespectrue
  \PassOptionsToClass{\CurrentOption}{report}
}
```

`a4paper` American institutions all use *letter* sized paper (8.5×11 inches) and not *a4* as is used in Europe.

```
\DeclareOption{a4paper}{
  \OptionNotUsed
  \ClassWarning{CSUNthesis}{CSU requires letter sized paper, a4paper
    ignored}{}
}
```

`Thesis types` Masters thesis come in three varieties. Certain wording in the front matter needs to be changed accordingly. The `thesis` , `project` and `abstract` document options set the conditionals that control such wording.

`thesis` Selects the wording to be "graduate thesis", causes an error if a different format has already been specified

```
\DeclareOption{thesis}{
  \ifproject
  \ClassError{CSUNthesis}{only one thesis type may be specified}{}
  \fi
  \ifabstract
  \ClassError{CSUNthesis}{only one thesis type may be specified}{}
  \fi
  \thesistrue
}
```

`project` Selects the wording to be "graduate project", causes an error if a different format has already been specified

```
\DeclareOption{project}{
  \ifthesis
  \ClassError{CSUNthesis}{only one thesis type may be specified}{}
```

```
  \fi
  \ifabstract
  \ClassError{CSUNthesis}{only one thesis type may be specified}{}
  \fi
  \projecttrue
}
```

`abstract` Selects the wording to be "graduate abstract", causes an error if a different format has already been specified

```
\DeclareOption{abstract}{
  \ifthesis
  \ClassError{CSUNthesis}{only one thesis type may be specified}{}
  \fi
  \ifproject
  \ClassError{CSUNthesis}{only one thesis type may be specified}{}
  \fi
  \abstracttrue
}
```

`Switch options` The front matter may contain lists of materials other than the *table of contents*. The CSUNthesis class provides a number of document options that control the presence or absence of these front matter pages.

`lof` `lof` causes a *list of figures* `list of figures` to be included in the front matter.

```
\DeclareOption{lof}{\loftrue}
```

`nolof` `nolof` prevents the *list of figures* `list of figures` from being included in the front matter. (This is the default if neither `lof` or `nolof` is specified.

```
\DeclareOption{nolof}{\loftrue}
```

`lol` `lol` causes a *list of listings* `list of listings` to be included in the front matter.

```
\DeclareOption{lol}{\loltrue}
```

`nolol` `nolol` prevents the *list of listings* `list of listings` from being included in the front matter. (This is the default if neither `lol` or `nolol` is specified.

```
\DeclareOption{nolol}{\loltrue}
```

`lot` `lot` causes a *list of tables* `list of tables` to be included in the front matter.

```
\DeclareOption{lot}{\lottrue}
```

`nolot` `nolot` prevents the *list of tables* `list of tables` from being included in the front matter. (This is the default if neither `lot` or `nolot` is specified.

```
\DeclareOption{nolot}{\lottrue}
```

`draft` The `draft` and `draftcls` options cause the baseline skip to be increased to 150% of normal. This facilitates proof-reading and corrections as it provides space for correction notations and makes such corrections easy to spot. They should not be used for the final publication.

```
\DeclareOption{draft}{\drafttrue\AtBeginDocument{\onehalfspacing}}
```

`draftcls` The `draft` and `draftcls` options are passed to the underlying `report` document style. `report` recognizes `draft` and will change many behaviors including spacing in the table of contents and in captions. This is usually not desirable. Most thesis authors will want to use the `draftcls` option instead. `draftcls` is not recognized by `report` and therefore only affects the format of the CSUNthesis features.

```
\DeclareOption{draftcls}{\drafttrue\AtBeginDocument{\onehalfspacing}}
```

`final` For final publication authors should either specify the document option `final` or specify no draft/final option as `final` is the default. This produces a document with a normal baseline skip.

```
\DeclareOption{final}{\draftfalse\AtBeginDocument{\singlespacing}}
```

`proposal` A simple switch that changes the format to a much more informal style that is adequate for producing a thesis proposal in the department of computer science.

```
\DeclareOption{proposal}{\proposaltrue}
```

`Base Style` The CSUNthesis class file is based on the basic `report` style of LaTeX. A boolean is used to determine if the author already specified a typesize that was, in turn, scheduled for forwarding to the *report* class. If no specific size option was provided then a default of 12pt is passed on to the *report* class.

```
\DeclareOption*{\PassOptionsToClass{\CurrentOption}{report}}
\ExecuteOptions{final}
\ProcessOptions\relax
\ifsizespec\relax\else\PassOptionsToClass{12pt}{report}\fi
\LoadClass{report}
```

Change tracking

LaTeX 2$_\varepsilon$ unfortunately does not do change tracking (also known as "red-lining" very well. To provide a rudimentary feature the `\edit{}`, `\delete{}` and `\add{}` macros are defined here.

The change tracking macros change the color of text. This requires the color pacage

```
\usepackage[usenames]{color}
```

The change tracking macros also want to strike-through text. This feature requires the ulem package and that normal emphasis style be restored.

```
\usepackage{ulem}
\normalem
```

`\udot`

Because must documents are destined to be printed on a monochrome device the color chnages that highlight changes may be lost during printing. To prevent loss of context all changes are also indicated by some sort of non-color visual. Deletions are struck through, changes are underlined nd notes are underlined with a wavy line. Something is also needed for additions. The ulem package doesn't have many predefined underline type but a couple are easy to implement. We define `\udot{}` for use with `\add` which produces an unobtrusive dotted underline style. A dashed underline style is also defined.

```
\newcommand{\udot}{\bgroup \markoverwith{\lower .4ex\hbox{.}}\ULon}
\newcommand{\udash}{\bgroup \markoverwith{\lower .8ex\hbox{-}}\ULon}
```

`\marginreason`

LaTeX 2$_\varepsilon$ can only handle 18 floats per page. This causes problems with change tracking because margin paragraphs (notes) are implemented as floats. Therefore if every change produces a margin note then you are limited to 18 changes per page. This is unacceptable because there are frequently more changes required per page and some changes have an obvious reason such as punctuation, spacing and capitalization. So we implement `\marginreason{}{}` which takes two arguments, The first being the color to format the reason and the second being the reason. If the reason is left empty (not just blank... empty `{}`) then the actual call to `\marginpar{}` is suppressed.

This macro is not perfect!! There are instances where it will fail. This code was adapted from `http://groups.google.com/group/comp.text.tex/browse_frm/thread/fdf45ac7b2eeff5f/2fff0f06937be0e7`.

```
\newcommand{\marginreason}[2]{%
\def\thereason{#2}%
\ifx\@empty\thereason\relax\else\marginpar{\color{#1}#2}\fi%
}
```

`\edit`

Text inside the `\edit macro` should be underlined and have it's color changed to red to indicate that something is wrong and needs to be corrected. The second

argument produces a marginpar that explains the needed change.

```
\newcommand\edit[2]{%
  \typeout{WARNING: edit change tracking macro exists in source}%
  {\color{Red}\uline{#1}}\marginreason{Red}{#2}}%
```

`\delete` Text inside the `\delete macro` is struck-through and has it's color changed to red to indicate that something should be deleted.

```
\newcommand\delete[2]{%
  \typeout{WARNING: delete change tracking macro exists in source}%
  {\color{Red}\sout{#1}}\marginreason{Red}{#2}}%
```

`\add` Text inside the `\add macro` is inserted into the document underlined and red. The second argument is formatted in a margin paragraph to explain the change.

```
\newcommand\add[2]{%
  \typeout{WARNING: add change tracking macro exists in source}%
  {\color{Red}\udot{#1}}\marginreason{Red}{#2}}%
```

`\replace` Text inside the `\replace macro` is marked for deletion. The second macro specifies what to replace with and the third is formatted as the margin paragraph. The formatting is identical to delete followed by add

```
\newcommand\replace[3]{%
  \typeout{WARNING: replace change tracking macro exists in source}%
  {\color{Red}\sout{#1}\udot{#2}}\marginreason{Red}{#3}}%
```

`\note` Text inside the `\note macro` inserts text that is descriptive but not intended as part of the final document. Wavy underline is used to help provide the note context. All notes should be removed prior to final publication. No reason argument is provided.

```
\newcommand\note[1]{%
  \typeout{WARNING: replace change tracking macro exists in source}%
  {\color{Red}\uwave{#1}}}%
```

Although, by default, LaTeX has a very professional appearance the CSU Northridge graduate evaluator dictates a more traditional "typewriter" appearance. It is therefore necessary to alter many of the basic LaTeX commands. The required commands are re-implemented here.

`\contentsname` The LaTeX default table of contents is labeled "Contents" the graduate evaluator dictates a heading of "Table of Contents". This change is minor and is implemented by simply redefining the default string.

```
\renewcommand\contentsname{\normalfont Table of Contents}
```

\bibname The LaTeX default table of contents is labeled "Contents" the graduate evaluator dictates a heading of "Table of Contents". This change is minor and is implemented by simply redefining the default string.

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

\@makechapterhead All modern, professional publications present chapter headings left justified, in a larger typeface and typeset with a larger top margin. This is contrary to the graduate evaluator's specifications. The \@makechapterhead is redefined for centering and normal to comply.

```
\def\@makechapterhead#1{%
  {\parindent \z@ \centering \normalfont
    \ifnum \c@secnumdepth >\m@ne
        \bfseries\boldmath \@chapapp\space \thechapter
        \par\nobreak
    \fi
    \interlinepenalty\@M
    \bfseries\boldmath #1\par\nobreak
    \vskip 20\p@
  }}
```

\@makeschapterhead the \begin{chapter*} must also be changed in case authors want a chapter that is not listed in the table of contents.

```
\def\@makeschapterhead#1{%
  {\parindent \z@ \centering
    \normalfont
    \interlinepenalty\@M
    \bfseries\boldmath #1\par\nobreak
    \vskip 20\p@
  }}
```

\@makepchapterhead like \@makechapterhead a correct \@makepchapterhead needs to be supplied so that preface chapter heads are produced correctly.

```
\def\@makepchapterhead#1{%
  {\parindent \z@ \centering
    \normalfont
    \interlinepenalty\@M
    #1\par\nobreak
    \vskip 20\p@
  }}
```

\prefacechapter Preface chapters are not allowed to be bold. A different chapter type is created to allow for preface chapters to formatted correctly.

```
\def\prefacechapter#1{\if@twocolumn
                        \@topnewpage[\@makepchapterhead{#1}]%
                      \else
```

```
                    \@makepchapterhead{#1}%
                    \@afterheading
                  \fi}
```

`\listoffigures` The list of figures is a preface page and all preface pages are not permitted to have bold wieght text. We call a different `\chapter*` type command that is identical to `\chapter*` but supresses boldface.

```
\renewcommand\listoffigures{%
    \if@twocolumn
      \@restonecoltrue\onecolumn
    \else
      \@restonecolfalse
    \fi
    \prefacechapter{\listfigurename}%
      \@mkboth{\MakeUppercase\listfigurename}%
              {\MakeUppercase\listfigurename}%
    \@starttoc{lof}%
    \if@restonecol\twocolumn\fi
    }
```

`\listoffigures` The list of tables is a preface page and all preface pages are not permitted to have bold wieght text.

```
\renewcommand\listoftables{%
    \if@twocolumn
      \@restonecoltrue\onecolumn
    \else
      \@restonecolfalse
    \fi
    \prefacechapter{\listtablename}%
      \@mkboth{%
          \MakeUppercase\listtablename}%
         {\MakeUppercase\listtablename}%
    \@starttoc{lot}%
    \if@restonecol\twocolumn\fi
    }
```

`\section` All modern, professional publications emphasize sections and subsections by larger typeface, weight or vertical spacing. The graduate evaluator dictates 12 point typeface throughout a thesis. The section, subsection and subsubsection commands are similarly redefined to comply. We do not account for the starred version of these sectioning commands and so they should not be used in a thesis.

Command for sections

```
\renewcommand{\section}{
  \@startsection{section}{1}{0mm}{0pt}{0.0001pt}%
{\noindent\normalfont\normalsize\bfseries\boldmath}}%
```

`\subsection` Command for subsections

```
\renewcommand{\subsection}{
  \@startsection{subsection}{1}{0mm}{0pt}{0.0001pt}%
{\noindent\normalfont\normalsize\bfseries\boldmath}}%
```

`\subsubsection` Command for subsubsections

```
\renewcommand{\subsubsection}{
  \@startsection{subsubsection}{1}{0mm}{0pt}{0.0001pt}%
{\noindent\normalfont\normalsize\bfseries\boldmath}}%
```

`\l@chapter` Contrary to modern publishing standards the graduate evaluator does not allow any typeface size or series differences in the front matter. Chapter entries in the table of contest, as provided byb LaTeX, violates this. Such entries are produced by the ł@chapter command. This command is redefined here to comply.

```
\renewcommand*\l@chapter[2]{%
  \ifnum \c@tocdepth >\m@ne%
    \addpenalty{-\@highpenalty}%
    \vskip 1.0em \@plus\p@%
    \setlength\@tempdima{1.5em}%
    \begingroup%
      \parindent \z@ \rightskip \@pnumwidth%
      \parfillskip -\@pnumwidth%
      \leavevmode%\bfseries
      \advance\leftskip\@tempdima%
      \hskip -\leftskip%
      #1\nobreak\hfil \nobreak\hb@xt@\@pnumwidth{\hss #2}\par%
      \penalty\@highpenalty%
    \endgroup%
  \fi}
```

`\maketitle` The `report` style causes a call to `\maketitle` at the `\begin{document}` command. The CSUNthesis class creates its own front matter. So `\maketitle` is trivialized to prevent its invocation from producing content.

```
\renewcommand{\maketitle}{}
```

`Formality`  Normally, sections are labeled $X.Y$. Proposals don't have chapter and thus no X. To prevent numbering of $0.Y$ the section numbering command is redefined. This will not provide provide proper sub- and subsub- section numbers.

```
\ifproposal
\renewcommand{\thesection}{\arabic{section}}
\fi
```

`Thesis type` The front matter creation pages require that at least one type be set in order to select the proper wording. This guarantees that at least `\thesistrue` will be set

internally in case the author does not specify one at all.

```
\ifthesis
\relax
\else
\ifabstract\relax\else\ifproject\relax\else\thesistrue\fi\fi
\fi
```

`Margins` It is generally a better idea to use the geometry package to specify page margins and layout dimensions. The `MikTeX` package does not include the geometry package by default. The page layout is not difficult so it is done through basic TEX commands so that the CSUNthesis class is easily used by `MikTeX` users (which doesn't provide the geometry package by default).

There is no header so header dimensions are reduced to zero.

Thesis are printed single sided so the odd side and even side margins are set equal.

```
\setlength{\headheight}{0.0in}     % results in 1.0inch
\setlength{\headsep}{0.0in}     % results in 1.0inch
\setlength{\topmargin}{0.0in}     % results in 1.0inch
\setlength{\textheight}{9.0in}
\setlength{\footskip}{0.5in}
\setlength{\oddsidemargin}{0.5in} % results in 1.5in
\setlength{\evensidemargin}{\oddsidemargin}
\setlength{\textwidth}{6.0in}
```

`Spacing` spacing is better handled through the setspace package because it knows how to adjust spacing for nearly all typeset elements including lists and quotes.

```
\RequirePackage{setspace}
```

`page style` Page style of plain is the default because that centers a page number and nothing else in the header and footer.

```
\pagestyle{plain}
```

`\@degree` The type of degree being fullfilled is stored in te `\@degree` macro. It is initially set to the default here but can be changed by author by issuing the `\degree` command.

```
\newcommand{\@degree}{Master~of~Science}
```

`\@department` The department the student is seeking the degree from is stored in a variable macro named `\@department`. That variable is created and initialized here to the default of computer science. Though other disciplines are encouraged to promote the use of LATEX amongst their graduates students.

```
\newcommand{\@department}{Computer~Science}
```

\degree The \degree command is used to change both the degree sought and the issuing department. It simply overwrites the defaults stored in the corresponding variable macros.

```
\newcommand{\degree}[2]{
  \renewcommand{\@degree}{#1}
  \renewcommand{\@department}{#2}
}
```

\bib

\references The production of the bibliography must appear before any appendecies and an entry in the table of contents must appear for the bibliography page title "References."

Authors should put the \references{}{} macro at the top of their doccument. The references will either be produced at the point where the author uses the \appendix macro or at the end of the document, which ever occurs first.

```
\newcommand{\references}[2]{
  \ifx\undefined\@thesisbibstyle
  \newcommand{\@thesisbibstyle}{#1}
  \else
  \renewcommand{\@thesisbibstyle}{#1}
  \fi
  \ifx\undefined\@thesisbibfile
  \newcommand{\@thesisbibfile}{#2}
  \else
  \renewcommand{\@thesisbibfile}{#2}
  \fi
}
```

\submitted The author must state the month and year in which the thesis is submitted to the graduate evaluator. This date is used in the front matter. A formal month and four digit year shall be used.

```
\newcommand{\submitted}[2]{
  \ifx\undefined\@submitmonth
  \newcommand{\@submitmonth}{#1}
  \else
  \renewcommand{\@submitmonth}{#1}
  \fi
  \ifx\undefined\@submityear
  \newcommand{\@submityear}{#2}
  \else
  \renewcommand{\@submityear}{#2}
  \fi
}
```

\defense Each author must announce the date of their defense. An announcement page is built automatically if the \defense command is present. This macro is provided

here and simply defines the four time and location values that are added to the committee, author and abstract information to create an announcement page.

```
\newcommand{\defense}[4]{
  \ifx\undefined\@defenseday
  \newcommand{\@defenseday}{#1}
  \newcommand{\@defensedate}{#2}
  \newcommand{\@defensetime}{#3}
  \newcommand{\@defenselocation}{#4}
  \else
  \renewcommand{\@defenseday}{#1}
  \renewcommand{\@defensedate}{#2}
  \renewcommand{\@defensetime}{#3}
  \renewcommand{\@defenselocation}{#4}
  \fi
}
```

`\contact` `\contact` provides the command to specify the contact content to place on the title page of proposals.

```
\newcommand{\contact}[1]{
  \ifx\undefined\@contact
  \newcommand{\@contact}{#1}
  \else
  \renewcommand{\@contact}{#1}
  \fi
}
```

`\collaboration` Provides the ability to specify a collaborative author. Leaving it undefined produces single authorship front matter.

```
\newcommand{\collaboration}[1]{
  \ifx\undefined\@collaborator
  \newcommand{\@collaborator}{#1}
  \else
  \renewcommand{\@collaborator}{#1}
  \fi
}
```

`\dedication` Using `\dedication` specifies the content for placing on a dedication page and causes the dedication page to be added to the front matter.

```
\newcommand{\dedication}[1]{
  \ifx\undefined\@dedication
  \newcommand{\@dedication}{#1}
  \else
  \renewcommand{\@dedication}{#1}
  \fi
}
```

\acknowledgement Using \acknowledgment specifies the content for placing on a acknowledgement page and causes the acknowledgement page to be added to the front matter.

```
\newcommand{\acknowledgement}[1]{
  \ifx\undefined\@acknowledgement
  \newcommand{\@acknowledgement}{#1}
  \else
  \renewcommand{\@acknowledgement}{#1}
  \fi
}
```

\preface Using \preface specifies the content for placing on preface pages and causes preface pages to be added to the front matter.

```
\newcommand{\preface}[1]{
  \ifx\undefined\@preface
  \newcommand{\@preface}{#1}
  \else
  \renewcommand{\@preface}{#1}
  \fi
}
```

\abstract Using \abstract specifies the content for placing on the abstract page. The use of this command is required since all thesis must have an abstract.

```
\renewcommand{\abstract}[1]{
  \ifx\undefined\@abstract
  \newcommand{\@abstract}{#1}
  \else
  \renewcommand{\@abstract}{#1}
  \fi
}
```

\copyrightyear The page following the title page is allowed to be a copyright page. If an author desires such a page then the use of the \copyrightyear will cause such a page to be added and uses the argument as the copyright year.

```
\newcommand{\copyrightyear}[1]{
  \ifx\undefined\@copyrightyear
  \newcommand{\@copyrightyear}{#1}
  \else
  \renewcommand{\@copyrightyear}{#1}
  \fi
}
```

\coordinator Provides for the graduate coordinator's name as a signature line on the proposal title page.

```
\newcommand{\coordinator}[1]{
  \ifx\undefined\@coordinator
```

```
  \newcommand{\@coordinator}{#1}
  \else
  \renewcommand{\@coordinator}{#1}
  \fi
}
```

`\committee` The thesis is approved by a committee of three faculty members. The front matter must contain a signature space with a line for each member to sign. The `\committee` command provides the means to specify the names of the committee members.

```
\newcommand{\committee}[3]{
  \ifx\undefined\@memberA
  \newcommand{\@memberA}{#2}
  \else
  \renewcommand{\@memberA}{#2}
  \fi
  \ifx\undefined\@memberB
  \newcommand{\@memberB}{#3}
  \else
  \renewcommand{\@memberB}{#3}
  \fi
  \ifx\undefined\@memberChair
  \newcommand{\@memberChair}{#1}
  \else
  \renewcommand{\@memberChair}{#1}
  \fi
}
```

`\frontpagesetup` The dedication, acknowledgement and preface pages have a slightly larger top margin. The `\frontpagesetup` sets up a generic page in the front matter for use as these types of pages.

```
\newcommand{\frontpagesetup}[1]{
%  \vspace*{\frontmattertopmargin}
  \begin{center}
    %\Large #1
    #1
  \end{center}
}
```

`\mpbibliography` A call to the `\mpbibliograph` causes the bibliography to be produced This is not for authors to call but rather for the end document and `\appendix` macro to call.

```
\newcommand{\mpbibliography}{
  \ifmadebib\relax\else
  \ifx\undefined\@thesisbibstyle
  \typeout{WARNING: YOU NEED A BIBLIOGRAPHY!! See the references macro}
  \else
  \bibliographystyle{\@thesisbibstyle}
  \bibliography{\@thesisbibfile}
```

```
  \addcontentsline{toc}{chapter}{\bibname}
  \madebibtrue\fi
  \fi
}
```

\appendix Most publications have the bibliography at the very end so that it is easy to find. The Graduate Evaluator's guidelines dictate that the bibliography for a thesis appears prior to the appendix. So a modification is made so that when an author switches chapters to appendix mode the bibliography is inserted first.

```
\renewcommand\appendix{\mpbibliography\par
  \setcounter{chapter}{0}%
  \setcounter{section}{0}%
  \gdef\@chapapp{\appendixname}%
  \gdef\thechapter{\@Alph\c@chapter}}
%    \begin{macrocode}
% \end{macro}

% \begin{macro}{\mpproposal}
% \changes{1.6}{14 Apr 2005}
%   {Modified proposal title page typeface size to be identical with document}
%   This command creates a title page. It relies on other commands to
%   set content details prior to its invokation.
%    \begin{macrocode}
\newcommand{\mpproposal}{
  \ifx\undefined\@author
  \ClassError{CSUNthesis}{no \protect\author{<author>} given.}{}
  \fi
  \ifx\undefined\@title
  \ClassError{CSUNthesis}{no \protect\title{<title>} given.}{}
  \fi
  {
    \thispagestyle{empty}
    \begin{center}
      \vspace*{\frontmattertopmargin}
      %University heading
%      \fontsize{12}{14.4}\selectfont
      CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

      %space before title
      \vspace{0.625in}

      %title
      %minipage required because the title should wrap rather narrow
      \begin{minipage}{5.5in}
\centering
\begin{spacing}{2.0}
%   \fontsize{12}{14.4}\selectfont

  \textbf{\MakeUppercase{\@title}}

\end{spacing}

```

```
%space before declaration
\vspace{0.375in}

\begin{spacing}{1.0}
%   \fontsize{12}{14.4}\selectfont

  \ifthesis A thesis
          \else
             \ifproject A graduate project
             \else An abstract
             \fi
          \fi
  proposal for the degree of
  \ifx\undefined\@degree
    Master~of~Science
  \else
    \@degree
  \fi
  \ in
  \ifx\undefined\@department
    Computer~Science
  \else
    \@department
  \fi

  \vspace{0.375in}

  by

  \vspace{0.375in}

  \@author
  \ifx\undefined\@contact
  \relax
  \else
  \\\@contact
  \fi

  \today

  \ifx\undefined\@collaborator
  \relax
  \else
  \vspace*{0.625in}
  in collaboration with\\\@collaborator
  \fi
\end{spacing}
      \end{minipage}

      % the date needs to be outside of the minipage so that \vfill
      % works to flush the date to the bottom of the page.

      \vfill
      \hfill
```

```
      \begin{minipage}{4.00in}

\makebox[2.75in]{\hrulefill}\makebox[0.5in][r]{Date:}
\hrulefill\\
\makebox[4.125in][l]{\@memberChair, Committee Chair}

\vspace{.25in}

\makebox[2.75in]{\hrulefill}\makebox[0.5in][r]{Date:}
\hrulefill\\
\makebox[4.125in][l]{\@coordinator, Graduate Coordinator}

\vspace{.25in}

\makebox[2.75in]{\hrulefill}\makebox[0.5in][r]{Date:}
\hrulefill\\
\makebox[4.125in][l]{\@author, Student}

      \end{minipage}
      %fill to the bottom of page
    \end{center}
  }
  \newpage
}
```

`\mpannouncement` Command to produce an announcement page. If the defense date has been set then the conditional will skip creating the announcement page. Announce page is not numbered and does not affect the numbering of other pages.

```
\newcommand{\mpannouncement}
{
  \ifx\undefined\@defensedate
  \relax
  \else
  \thispagestyle{empty}
  % save current margin information
  \newlength{\oldwidth}
  \newlength{\oldoddside}
  \newlength{\oldtop}
  \newlength{\oldheight}
  \setlength{\oldtop}{\topmargin}
  \setlength{\oldheight}{\textheight}
  \setlength{\oldwidth}{\textwidth}
  \setlength{\oldoddside}{\oddsidemargin}
  % set new margins for even page layout
  \setlength{\oddsidemargin}{0.25in}
  \setlength{\textwidth}{6in}
  \setlength{\topmargin}{0.25in}
  \setlength{\textheight}{8.5in}
  % draw the simple border frame
  % picture width and height needs to be (0,0) so as not
  % to take up space. (you can draw outside the boundary
  \noindent\begin{picture}(0,0)(72,-81.5)
```

```
  \put(0,0){\line(1,0){576}}
  \put(0,0){\line(0,-1){756}}
  \put(576,-756){\line(-1,0){576}}
  \put(576,-756){\line(0,1){756}}
  \end{picture}
  \vspace{-.5in}
  \begin{center}
    \bfseries
    \begin{minipage}{5in}
      \begin{center}
MASTERS PRESENTATION

\vspace{0.5in}

\MakeUppercase{\@title}

By

\@author
      \end{center}

      \noindent Committee Members:
      \begin{list}{}{\leftmargin=2in\itemsep=-6pt\topsep=-6pt}
      \item \@memberChair\ (Chair)
      \item \@memberA
      \item \@memberB
      \end{list}

      \vspace{14pt}
      \noindent\begin{tabular}{@{}ll}
      Date: & \@defenseday, \@defensedate\ at \@defensetime \\
      Location: & \@defenselocation
      \end{tabular}
    \end{minipage}
  \end{center}
  \begin{center}
    \bfseries ABSTRACT
  \end{center}
  \noindent \@abstract

  % generate the page
  \newpage
  %reset margins to original values
  \setlength{\oddsidemargin}{\oldoddside}
  \setlength{\textwidth}{\oldwidth}
  \setlength{\textheight}{\oldheight}
  \setlength{\topmargin}{\oldtop}
  \fi
}
```

`\mptitle` Creates the title page for thesis, projects and abstracts.

```
\newcommand{\mptitle}{
```

```
  \ifx\undefined\@submitmonth
  \ClassError{CSUNthesis}{no
    \protect\submitted{<month>}{<year>}given.}{}
  \fi
  \ifx\undefined\@submityear
  \ClassError{CSUNthesis}{no
    \protect\submitted{<month>}{<year>}given.}{}
  \fi
  \ifx\undefined\@author
  \ClassError{CSUNthesis}{no \protect\author{<author>} given.}{}
  \fi
  \ifx\undefined\@title
  \ClassError{CSUNthesis}{no \protect\title{<title>} given.}{}
  \fi
  {
    \thispagestyle{empty}
    \setcounter{page}{1}
    \begin{center}
      \vspace*{\frontmattertopmargin}
      %University heading
%      \fontsize{12}{14.4}\selectfont
      CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

      %space before title
      \vspace{1.625in}

      %title
      %minipage required because the title should wrap rather narrow
      \begin{minipage}{\titlewidth}
\centering
\begin{spacing}{2.0}
%   \fontsize{12}{14.4}\selectfont

  \MakeUppercase{\@title}

\end{spacing}

%space before declaration
\vspace{0.375in}

\begin{spacing}{1.0}
%   \fontsize{12}{14.4}\selectfont

  \ifthesis A thesis
          \else
             \ifproject A graduate project
             \else An abstract
             \fi
          \fi
  submitted in partial fulfillment of the
  requirements for the degree of
  \ifx\undefined\@degree
    Master~of~Science
  \else
```

```
    \@degree\
  \fi
  in
  \ifx\undefined\@department
    Computer~Science
  \else
    \@department
  \fi

  \vspace{0.375in}

  by

  \vspace{0.375in}

  \@author
  \ifdraft
  \ifx\undefined\@contact
  \relax
  \else
  \\\@contact
  \fi
  \fi

  \ifx\undefined\@collaborator
  \relax
  \else
  \vspace*{0.625in}
  in collaboration with\\\@collaborator
  \fi
\end{spacing}
      \end{minipage}

      % the date needs to be outside of the minipage so that \vfill
      % works to flush the date to the bottom of the page.

      %fill to the bottom of page
      \vfill

%      \fontsize{12}{14.4}\selectfont

      \@submitmonth\ \@submityear
    \end{center}
  }
  \newpage
}
```

`\mpcopyright` Creates the copyright page if a copyright year has been provided.

```
\newcommand{\mpcopyright}{
  \ifx\undefined\@copyrightyear
    \relax
  \else
```

```
  \null\vfill
  \begin{center}
    %\fontsize{14}{16.8}\selectfont
%    \fontsize{12}{14.4}\selectfont
    \copyright\ Copyright\ by \@author\ \@copyrightyear\\
    All Rights Reserved
  \end{center}
%  \vfill
  \addcontentsline{toc}{chapter}{Copyright}
  \newpage
  \fi
}
```

`\mpsignature` Creates the signature page, with committee names

```
\newcommand{\mpsignature}{
  \ifx\undefined\@memberA
  \ClassError{CSUNthesis}{No
    \protect\committee given; must be provided}{}
  \fi
  \ifx\undefined\@memberB
  \ClassError{CSUNthesis}{No
    \protect\committee given; must be provided}{}
  \fi
  \ifx\undefined\@memberChair
  \ClassError{CSUNthesis}{No
    \protect\committee given; must be provided}{}
  \fi
  \ifx\undefined\@author
  \ClassError{CSUNthesis}{no \protect\author{<author>} given.}{}
  \fi
  \vspace*{2.5in}
  \begin{center}
%    \fontsize{12}{14.4}\selectfont
    \begin{minipage}{5.05in}
      The
      \ifthesis
      thesis
      \else
      \ifproject
      graduate project
      \else
      abstract
      \fi
      \fi
      of \@author\ is approved:

      \vspace*{1in}

      \makebox[3in]{\hrulefill}\makebox[0.5in]{}
      \makebox[1.5in]{\hrulefill}\\
      \makebox[3in][l]{\@memberA}\makebox[0.5in]{}
      \makebox[1.5in][l]{Date}
```

```
719
720       \vspace{.375in}
721
722       \makebox[3in]{\hrulefill}\makebox[0.5in]{}
723       \makebox[1.5in]{\hrulefill}\\
724       \makebox[3in][l]{\@memberB}\makebox[0.5in]{}
725       \makebox[1.5in][l]{Date}
726
727       \vspace{.375in}
728
729       \makebox[3in]{\hrulefill}\makebox[0.5in]{}
730       \makebox[1.5in]{\hrulefill}\\
731       \makebox[3in][l]{\@memberChair, Chair}\makebox[0.5in]{}
732       \makebox[1.5in][l]{Date}
733
734     \end{minipage}
735     \vfill
736     California State University, Northridge
737   \end{center}
738   \addcontentsline{toc}{chapter}{Signature page}
739   \newpage
740 }
```

`\mppreface` Creates preface pages based on the preface content specified by `\preface`.

```
741 \newcommand{\mppreface}{
742   \ifx\undefined\@preface
743     \relax
744   \else
745     \frontpagesetup{Preface}
746     \@preface
747     \addcontentsline{toc}{chapter}{Preface}
748     \newpage
749   \fi
750 }
```

`\mpdedication` Creates a dedication page if dedication material has been provided.

```
751 \newcommand{\mpdedication}{
752   \ifx\undefined\@dedication
753     \relax
754   \else
755     \frontpagesetup{Dedication}
756     \@dedication
757     \addcontentsline{toc}{chapter}{Dedication}
758     \newpage
759   \fi
760 }
```

`\mpackknowledgement` Creates an acknowledgement page if acknowledgement material has been provided.

```
\newcommand{\mpacknowledgement}{
  \ifx\undefined\@acknowledgement
    \relax
  \else
    \frontpagesetup{Acknowledgements}
    \@acknowledgement
    \addcontentsline{toc}{chapter}{Acknowledgements}
    \newpage
  \fi
}
```

`\mptableofcontents` Creates the table of contents. A simple wrapper around the LaTeX command.

```
\newcommand{\mptableofcontents}{
  \newlength{\oldparskip}
  \setlength{\oldparskip}{\parskip}
  \setlength{\parskip}{0pt}
  \addcontentsline{toc}{chapter}{Table of Contents}
  \tableofcontents
  \setlength{\parskip}{\oldparskip}
  \newpage
}
```

`\mplistoftables` Conditionally creates the list of tables.

```
\newcommand{\mplistoftables}{
  \iflot
    \addcontentsline{toc}{chapter}{List of Tables}
    \listoftables
    \newpage
  \fi
}
```

`\mplistoffigures` Conditionally creates the list of figures.

```
\newcommand{\mplistoffigures}{
  \iflof
    \addcontentsline{toc}{chapter}{List of Figures}
    \listoffigures
    \newpage
  \fi
}
```

`\mplofillustrations` Conditionally creates the list of illustrations. (Currently a command that does nothing.)

```
\newcommand{\mplofillustrations}{}
```

`\mplistoflistings` Conditionally creates the list of source code listings.

```
\newcommand{\mplistoflistings}{
  \iflol
    \renewcommand{\lstlistlistingname}{\normalfont List of Listings}
    \addcontentsline{toc}{chapter}{List of Listings}
    \lstlistoflistings
    \newpage
  \fi
}
```

`\mpabstract` Formats and creates the abstract page.

```
\newcommand{\mpabstract}
{
  \ifx\undefined\@abstract
    \ifproposal\relax\else
      \ClassError{CSUNthesis}
 {No \protect\abstract given; must be provided}{}
    \fi
  \fi
  {
%    \vspace*{40pt}
    {
%    \fontsize{12}{14.4}\selectfont
    \newlength{\oldbaselineskip}
    \setlength{\oldbaselineskip}{\baselineskip}
    \setlength{\baselineskip}{34pt}
    \begin{center}
      ABSTRACT

      \MakeUppercase{\@title}

      By

      \@author

      \@degree\ in \@department
    \end{center}
    }
    %\setlength{\baselineskip}{\oldbaselineskip}
    \@abstract
  }
  \addcontentsline{toc}{chapter}{Abstract}
  \newpage
}
```

`\AtBeginDocument` When the author invokes the `\begin{document}` environment all of the commands that make front matter pages (`\mp*`) are called in order to produce the properly formatted front matter. All pages creation commands are invoked and control of whether or not individual pages are actually created are left up to the individual page making commands.

```
\AtBeginDocument{
```

```
  \pagenumbering{roman}
  \ifproposal
  \mpproposal
  \else
  \mpannouncement
  \mptitle
  \mpcopyright
  \mpsignature
  \mpdedication
  \mpacknowledgement
  \mppreface
  \mptableofcontents
  \mplistoftables
  \mplistoffigures
  \mplofillustrations
  \mplistoflistings
  \mpabstract
  \fi
  \pagenumbering{arabic}
}
```

`\AtEndDocument` At the end of the document the bibliography is automatically produced if a bibliographic style has been provided.

```
\AtEndDocument{%
\mpbibliography%
}
```

References

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