

# L<sup>A</sup>T<sub>E</sub>X Thesis

2024

This class was originally written by John P. Weiss in 1998 and tested on many theses since then. All the prologue pages of the thesis (everything before chapter 1) are generated by L<sup>A</sup>T<sub>E</sub>X using the information you type in the prologue commands (§2). The style options (§3) for thesis class allow you to choose from among some permitted variations in the look of your thesis, especially how headings are formatted and numbered. Some L<sup>A</sup>T<sub>E</sub>X commands which work with report class have been disabled in thesis class, while other commands have been added or altered (§4).

Most L<sup>A</sup>T<sub>E</sub>X packages can be used with thesis class, and in particular, it's a good idea to include the graphicx package in the preamble, so that bitmap images (PNG, JPG) and vector images (PDF) can be inserted using the `\includegraphics` macro. (Convert EPS files to PDF using `eps2pdf`.) On the other hand, the hyperref package causes conflicts in this class. To get internal hyperlinks in the PDF version of the document, users will have to use report class instead.

## 1 Overview

The overall structure of a thesis' main \*.tex file, using thesis class, should be like this:

```
documentclass[ options ]{thesis}
    prologue commands
\begin{document}
    main text in chapters, then bibliography, then appendix
\end{document}
```

Thesis Class is a variation of the basic report class of L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>, so it takes many of the same options. The simplest two options, "11pt" and "12pt", change the font size from the default 10-point. Other options have been defined for thesis class to control elements of style within the restrictions of the Grad School specifications. Otherwise, a thesis can use all L<sup>A</sup>T<sub>E</sub>X macros just as described in the references (2, 3).

The figure on page 2 shows the contents of a fictitious thesis file, `mythesis.tex`, that uses the L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> thesis class. The main elements of a thesis are shown in correct order. The main text of a thesis, as illustrated in the figure, is actually typed into separate .tex files, which are included in the proper order using the `\input` macro. The optional appendix sections come after the bibliography.

## 2 Prologue Commands

At the beginning of every University of Colorado thesis are a series of special "prologue" pages, including the titlepage, abstract page, and signature page. These will be generated automatically if you provide the necessary information.

Figure 1: Sample L<sup>A</sup>T<sub>E</sub>X source for a thesis

```

\documentclass[11pt,modernstyle]{thesis} % this is file mythesis.tex

\usepackage{amssymb} % to get all AMS symbols
\usepackage{graphicx} % to insert figures; PDF, PNG, JPG

\title{Five-Dimensional Tic-Tac-Toe; A Winning Strategy}

\author{I.~B.}{Scriptor}

\otherdegrees{B.A., North Dakota State University, 2005 \\  
M.S., University of Reno, 2007}

\degree{Doctor of Philosophy} % #1 {long descr.}
      {Ph.D., Applied Gaming} % #2 {short descr.}

\dept{Department of}{Applied Gaming}

\advisor{Prof.}{Kevin Kilgore}

\reader{Prof.~Rachel Goddard} % 2nd person to sign thesis
\readerThree{Ms.~Thora Nea} % 3rd person to sign thesis

\abstract{ \OnePageChapter % special macro
  Classic research in Tic-Tac-Toe has concentrated on the
  two-dimensional game. A few hardy souls can beat their
  computer in the three-dimensional version but the existence
  of a winning strategy in five dimensions has not been proven.}

\dedication[Dedication]{
  To my friends on the playground.}

\acknowledgements{ \OnePageChapter % again!
  Professor Goddard provided computing facilities for
  stochastic tests on large 5D systems. \par This research
  funded by DOD grant #98F4JG3.275II:5.
}

% \ToCisShort % Table of Contents is *2* pages long
% \LoFisShort % one-page List of Figures
% \emptyLoT % no list of tables

\begin{document}

\input macros.tex % my file of LaTeX macros

\input ch1.tex
\input ch2.tex
\input ch3.tex
\input ch4a.tex % long chapter.
\input ch4b.tex
\input ch5.tex

\input biblio.tex % bibliography

\appendix % to be numbered A, B
\input appA.tex % stats for 2D through 4D
\input appB.tex % related games

\end{document}

```

### ch1.tex

```

\chapter{Introduction} % ch

Tic-Tac-Toe. To some, it's a mind
To others, it's a test of skill an

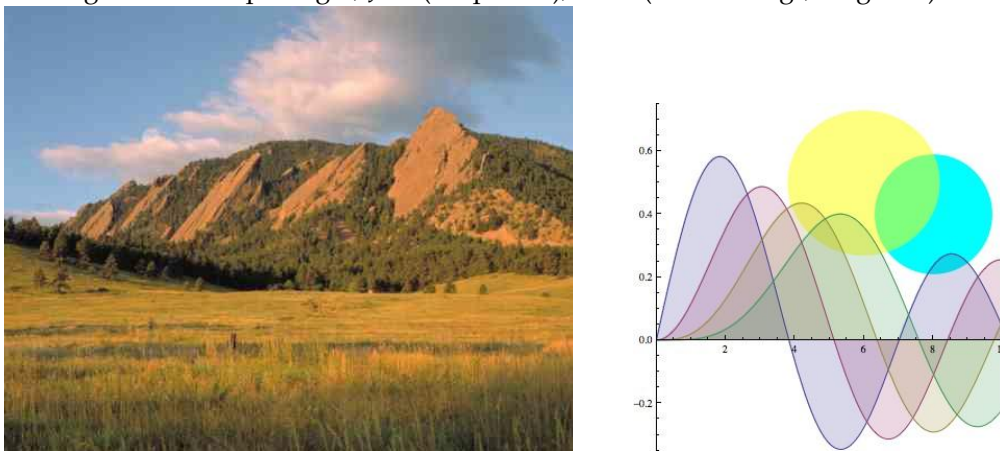
Easily extended to higher that the
it is quickly obvious that the siz
must be increased from three to ma

% Section 1.1
\section{Experience with Three Dim

The popular 3-dimensional version
\includegraphics{ttt.png}
was marketed years ago as a box ga
Anyone can now download the same g
own computer in any number of form
\includegraphics{ABB.pdf} Followin
the following intuitive rules:
\begin{itemize}
\item a good offense will always

```

Figure 2: Bitmap Images; JPG (for photos), PNG (for drawings, diagrams).



## 2.1 Required information

Below are the commands you must use in the preamble before the `\begin{document}` command. They can be entered in any order. If you forget to put any of these in the preamble, L<sup>A</sup>T<sub>E</sub>X will generate an error.

- `\title{...}`  
The title of your thesis. Don't explicitly break the lines using the `"\"` command; let L<sup>A</sup>T<sub>E</sub>X do it.
- `\author{ first middle } { last }`  
Be sure to remember and divide your name as shown above.
- `\advisor{ title } { name }`  
Your advisor's full name and title. The name should be in the usual order (first, middle, last). The "title" is your advisor's official university title, e.g., "Professor" or "Assistant Professor".
- `\reader{ full name }`  
The name of the second person who will sign your thesis. The name should be in the usual order (first, middle, last). If you have additional readers, use the optional commands `\readerThree{}` and `\readerFour{}` in the same way.
- `\degree{ long description } { short description }`  
The first argument is the long description of your degree, e.g., "Doctor of Philosophy" or "Masters of Science". The second argument is the abbreviated description of the degree followed by the subject, e.g., "Ph.D., Biology".
- `\dept{ designation } { name }`  
The department granting your degree. The first argument is the official university designation of the department, e.g., "Department of" or "College of" or "School of". The second argument is the department name, e.g., "Mathematics".
- `\otherdegrees{ ... }`  
The list of other degrees you hold, as described in the Specifications (1). Break lines using the `"\"` command.
- `\abstract{\onePageChapter ... }`  
Use this for your thesis abstract. In the body of the abstract you can include commands, math mode, multiple paragraphs, etc. Leave out the `\onePageChapter` if your abstract runs over one page.

## 2.2 Optional prologue commands

The following commands are optional.

- `\degreeyear{...}`  
The year you receive your degree. If you don't include this, L<sup>A</sup>T<sub>E</sub>X will just use the current year.
- `\dedication[ title J{ ... }]`  
The dedication page. The first argument, the title, is optional. The second argument is the body of the dedication. Keep it all under one page. Do not use the command `\OnePageChapter` here, since the dedication page must not be numbered.
- `\acknowledgements{\OnePageChapter ... }`  
This is the acknowledgements page. The sole argument is the body of the page. Anything valid can go in here. Leave out the `\OnePageChapter` command if the acknowledgements run to two pages...
- `\readerThree{ ... }, \readerFour{ ... }, \readerFive{ ... }`  
Use as needed in case you have extra readers.
- `\IRBprotocol{number}`  
This appends an IRB protocol number to the signature page.

## 2.3 Prologue Page Numbering

The Graduate School requires that you not number the first page of every chapter, unless the chapter is only one page long, in which case, you must number it. Numbering of the pages of a chapter thus begins with the 2nd page unless you use the "`\OnePageChapter`" command. For example, you will probably use this command in your `\abstract{}` and `\acknowledgements{}` command unless either is longer than a single page. But do not use it in your dedication page, because that is never supposed to be numbered.

Three of the prologue sections are generated by L<sup>A</sup>T<sub>E</sub>X and not created explicitly by you; the table of contents, list of figures, and list of tables. To indicate that any of these are only one page long, or nonexistent, use the following commands as needed.

<code>\ToCisShort</code>	(1-page Table of Contents)
<code>\emptyLoF</code>	(no List of Figures)
<code>\LoFisShort</code>	(1-page List of Figures)
<code>\emptyLoT</code>	(no List of Tables)
<code>\LoTisShort</code>	(1-page List of Tables)

## 3 Style Options

There are three main style options: `typewriterstyle`, `modernstyle`, and `defaultstyle`, described in §3.2. Each is actually a specific combination of the following "base options".

### 3.1 Base options

Each of the following nine base options controls a single aspect of the thesis' appearance. You can use any combination of the following, e.g.,

```
\documentclass[plainhead, consecutivenumbering, inlinh4J]{thesis}.
```

- `consecutivenumbering` Changes the numbering style of figures, tables, and equations to consecutive numbering throughout the thesis. Otherwise (by default), figures and tables and equations are numbered first by chapter, then by appearance within the chapter. You would want to use this option if you have very few equations, figures, and tables in your thesis, or if they are all concentrated in a single chapter.

- `inlineh4` Inlines the `"\subsubsection{}"` heading into the beginning of the paragraph. By default, the heading is on a separate line and is left-justified.
- `nonumh4` Removes numbering from the `"\subsubsection{}"` heading. By default, the heading is numbered.
- `centerh1` Center the `"\section{}"` heading. The section number, however, remains left-justified. By default, `\section` headings are left-justified.
- `chapleft` Left-justifies `"\chapter{}"` headings. By default: `\chapter` headings are centered.
- `chapup` Make all `"\chapter{}"` headings uppercase. By default, the case of the heading and its label aren't altered.
- `plainhead` Makes all headings use plain text. By default, all headings use boldface text.
- `fixedheadsize` Makes all headings use the default text size. By default, `\chapter{}` and `\section{}` headings are printed in 12-point text, regardless what the default text size is.
- `emph2underline` Changes the `"\emph{...}"` command so that it generates underlining instead of italics, and the `"\em"` command generates a warning. By default, both `\em` and `\emph{}` generate boldface instead of italics.

## 3.2 Main options

This class provides three main options which are just special combinations of the base options listed above. Using one of these overrides all the base options.

- `typewriterstyle` This is the style given as an example in the Graduate School's thesis Specifications (1). There is one uniform font size, and all headings are plain. Only chapter headings are numbered, and the text of the chapter heading is set in uppercase letters. Section headings are centered, and any heading below a subsection is inlined. It is the sum of the five base options `numberchapteronly`, `emph2underline`, `plainhead`, `fixedheadsize`, and `chapup`.
- `modernstyle` This is a modification of the default style of the `report` class. Headings are all in boldface, and chapter, section, and subsection headings are numbered. Section and subsection headings are left-justified. Subsubsection headings and below are inlined. Lastly, the size of the chapter and section headings aren't as large as the default in the `report` class. This option is the sum of two base options, `inlineh4` and `nonumh4`.
- `defaultstyle` This is virtually identical to `modernstyle` with one exception: subsubsections are now numbered and left-justified. It is equivalent to no options at all, i.e., it enforces all the stylistic defaults.

# 4 New and Altered Commands

## 4.1 Redefined Commands

Several L<sup>A</sup>T<sub>E</sub>X commands defined for the `report` class are redefined to provide different behavior in `thesis` class, conforming to the Specifications (1).

- `{\em ... }` and `\emph{ ... }`  
The Graduate School forbids italicized text, except in certain specific circumstances, so the `"\em"` and `"\emph{...}"` commands are redefined to produce boldface text. If you use the `"typewriterstyle"` class option, then underlined text is used instead.
- `\begin{itemize} ... \end{itemize}`  
`\begin{enumerate} ... \end{enumerate}`  
The labels for both these lists are different from the L<sup>A</sup>T<sub>E</sub>X `report` defaults.
- `\newtheorem{...}{...}[...]`  
The text of the theorem will be in the default font, not italicized.

- `\begin{verse} ... \end{verse}`  
`\begin{quote} ... \end{quote}`  
`\begin{quotation} ... \end{quotation}`  
`\begin{thebibliography} ... \end{thebibliography}`

These environments have been changed so that they use single-spacing instead of double-spacing. The bibliography environment is defined to underline titles, rather than using italics or boldface, even when you don't choose `typewriterstyle`.

- `\subsection{...}`  
`\subsubsection{...}`  
`\paragraph{...}`

The thesis class does not recognize optional arguments for these commands, nor their starred versions (e.g., `\subsection*`).

## 4.2 New Commands

The `singlespace` environment, `\begin{singlespace} ... \end{singlespace}`, permits you to do single-spacing inside the abstract or body of the thesis, where the default is double-spacing. Two other commands, `\singlespacing` and `\doublespacing`, are provided as an inelegant but effective last-resort way to switch spacing modes.

Page numbering is something that isn't fully programmed in the thesis class macros. In a thesis, one-page chapters must be numbered (except for the dedication page), and you must do this manually. Issue the `\OnePageChapter` command immediately after a "`\chapter`" command if the chapter is only a page long.

Page numbering in the automatically-generated prologue pages (contents page, etc.) is controlled with other commands, described in §2.3.

## 4.3 Obsolete Commands

Most of the formatting commands and length definitions possible in L<sup>A</sup>T<sub>E</sub>X are disallowed in thesis class. For example, margins lengths are prescribed by the Grad School Specifications (1), so none of them may be redefined with the `\setlength{}{}` command.

In addition, many of the class options which are valid for report class are disallowed in thesis class: `titlepage`, `notitlepage`, `twoside`, `twocolumn`, `landscape`, `legalpaper`, `a4paper`, `a5paper`, `b5paper`, and `executivepaper`.

Finally, these four L<sup>A</sup>T<sub>E</sub>X commands are disabled in thesis class, and will generate warning messages if you try to use them: `\theindex`, `\thepart`, `\twocolumn`, and `\part`.