NMT 2013 Thesis Stylesheet: Internals

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Abstract

Describes the implementation of the LaTeX stylesheet for New Mexico Tech theses and dissertations. The actual code is included.

This publication is available in Web form\(^1\) and also as a PDF document\(^2\). Please forward any comments to tcc-doc@nmt.edu.

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\(^1\) http://www.nmt.edu/tcc/help/pubs/nmtthesis/ims2013/
1. Introduction

To help New Mexico Tech graduate students write clear, attractive theses and dissertations that conform to the formatting requirements of the Graduate Office, the Tech Computer Center maintains a stylesheet for the LaTeX document preparation system. The instructions for using the stylesheet are online: see Using the NMT LaTeX thesis style.

This document presents the actual LaTeX commands of the stylesheet in lightweight literate programming form.

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1. Introduction

To help New Mexico Tech graduate students write clear, attractive theses and dissertations that conform to the formatting requirements of the Graduate Office, the Tech Computer Center maintains a stylesheet for the LaTeX document preparation system. The instructions for using the stylesheet are online: see Using the NMT LaTeX thesis style.

This document presents the actual LaTeX commands of the stylesheet in lightweight literate programming form.
For the reader unfamiliar with LaTeX, especially the construction of style and class files, here are some good resources.

  Goes into more depth on stylesheet and class file construction.

2. Online files

These files are available online:

- nmtthesis2013.sty\(^6\): The stylesheet.
- latexims.xml\(^7\): DocBook source for this document.

3. The previous package

This package replaces an older version, unchanged since 2002, and with roots extending back to at least 1986.

There is no external documentation for this package. There are only two files.

- A starting thesis template is provided, [http://www.nmt.edu/tcc/help/pubs/nmtthesis/old/disstemplate.tex](http://www.nmt.edu/tcc/help/pubs/nmtthesis/old/disstemplate.tex). Comments in this file are the only user-level documentation.

The present author has written an annotated narrative version of the old style file. See [Annotated source for nmtthes2000.sty](http://www.nmt.edu/tcc/help/pubs/nmtthesis/old/annotated). This narrative also points to the original or “stock” style files and discusses how nmtthes2000.sty is derived from them.

The author wishes to express his appreciation for the assistance of Dr. Sue Goudy, who used the old stylesheet to do her dissertation in 2004. For most of the details of layout not strictly specified by the Graduate Office, the author copied the appearance of this dissertation.

Aside from the lack of external and internal documentation, the main problem with the old stylesheet is that it is a mixture of TeX, ancient obsolete LaTeX, and small amounts of current LaTeX practice. The goal of the current effort is to use only current LaTeX practice in preference to TeX, where equivalents exist. Support has also been added for two features not supported in the old stylesheet: epigraph and frontispiece pages.

4. General design considerations

The Graduate Office specification leaves many details of appearance unspecified. Rather than trying to nail down these details, the author’s aim is to implement a reasonably clear and attractive generic style. Thesis writers who prefer different design details can always override the stylesheet.

\(^8\) [http://www.nmt.edu/tcc/help/pubs/nmtthesis/old/annotated](http://www.nmt.edu/tcc/help/pubs/nmtthesis/old/annotated)
4.1. Sectioning commands

The Graduate Office has this to say about dividing chapters into sections:

Each subdivision of the thesis bears a title that is prepared in a style unique to that subdivision level; i.e., each level has a format that is used only for that level of subdivision title throughout the thesis. The subheading scheme must take into account the chapter with the maximum number of subdivision levels, and the hierarchy once chosen must be adhered to throughout all major divisions of the thesis.

So we must come up with a unique format for each level of sectioning command. The old stylesheet use boldfaced, normal-sized type for each command, and distinguished them by their spacing:

- Section titles were numbered and flush left. Continuation lines were indented to align with the text just after the section number.
- Subsection titles were numbered, and indented the same amount as the normal paragraph indent. Continuation lines were actually unindented about 8 points relative to the beginning of the section number; surely this is an error—it looks terrible.
- Subsubsection titles were unnumbered and set flush left.

In the author's opinion, the indented subsection titles look rather odd. In theory, the requirement that different levels of sectioning have different appearance is satisfied perfectly well by having different section numbers: one for section, two for subsection, and three for subsubsection.

However, in order to make the different levels more visually distinct, and because the Goudy dissertation formatted with the old stylesheet passed inspection, we will implement these same rules (without the aforementioned problem with continuation lines in subsection titles), with one exception: The title of a subsubsection command will be unnumbered and boldfaced, but run-in to the following paragraph.

4.2. Paragraphs

The old stylesheet used a rather large paragraph indent, 48 points. It also specified a small vertical space between paragraphs, 4.5–6.5 points. Stock LaTeX values for these sizes are 15 points and 0–1 points, respectively.

The style guide has nothing to say about either of these parameters, so the decision is fairly arbitrary. The author feels that the slightly larger inter-paragraph skip makes it easier to pick out paragraphs, and the larger indentation is necessary to make paragraphs stand out with the double-spaced body type. In the absence of further input, we will retain the old stylesheet's interparagraph skip, but the paragraph indent is a bit large, so we'll reduce it to half an inch.

4.3. Formatting bibliography entries

The way references are formatted in the {References} or {Bibliography} environments must be different, depending on whether the citations use the [Author, Year] format, or whether they are bracketed numbers such as [39].

These paragraph shape changes are achieved by using the generic {list} environment. The diagram on page 76 of Kopka illustrates the relevant lengths \labelwidth, \labelsep, \leftmargin, and \itemindent. For either author-year or numeric citation style, the \labelsep length is set to one pica to separate the reference key from the body of the reference.

Because author-year citations may be lengthy, they are run-in to the reference entry, like this:

http://www.nmt.edu/tcc/help/pubs/nmtthesis/old/annotated/user-commands.html#section
For the style shown above, the \leftmargin is set to a comfortable value (2 picas). The \labelwidth is set to zero, and the \itemindent set to minus the \leftmargin value, so the author’s name starts flush left, with a hanging indentation on continuation lines.

If the references are cited by number, the entry is shaped like this:

Here, the \labelwidth is set according to the given sample text (e.g., “99”), plus square brackets. The \leftmargin is set to the sum of \labelsep and \labelwidth. The \itemindent is set to zero.

5. Naming conventions

To make a command internal to a style file, it must contain at least one “@” character.

Our general convention will be that this character is appended to one-word names. For multi-word names, it separates the first and second words. Examples:

\author@
\make@chapterhead

6. Prologue to the LaTeX style file

The style file will be called nmtthesis2013.sty. Here are the initial lines of the file, which serve to identify the file, point back to this documentation, and inform LaTex what package and version are being supplied. The \typeout command displays the current version when the document is compiled.
7. Packages used

This section of the style file contains \usepackage commands that import optional LaTeX packages. The mathpazo package selects an attractive modern serifed font, Palatino, for the type face.

\begin{verbatim}
%================================================================
% Packages used
%----------------------------------------------------------------
\usepackage{mathpazo}
\end{verbatim}

The ifthen package supports branching and iteration such as \ifthenelse and \whiledo.

\begin{verbatim}
\usepackage{ifthen}
\end{verbatim}

8. General page layout

This section sets up the overall dimensions of the page. This style is primarily intended for the required single-sided printing, but it also allows double-sided printing, which can save a lot of paper during the draft cycles.

\begin{quote}
\textbf{Note}

The final draft must be one-sided. Specify the oneside option in the \documentclass for the finished draft.

The specification also stipulates 8.5″×11″ paper.
\end{quote}

\begin{quote}
\textbf{Warning}

When printing a PDF file on the Tech Computer Center's printers, be sure to use Adobe Reader (formerly Acrobat Reader) rather than sending the file directly to the printer—direct transmission will scale the page to fit the paper.

Also, in the Adobe Reader print menu, be sure to set Page Scaling to None, and uncheck the Auto Rotate and Center option. If you don’t do this, the sizes and margins will not be what you have specified.
\end{quote}

8.1. Horizontal dimensions

The specification states that the left margin must be at least 1.5″ and the right margin at least 1″, with the. For double-sided printing, we’ll interpret that to mean that the inner (bound side) margin must be 1.5″, and the rest are 1″.

For the text width, 8.5–1.5–1.0 leaves 6″. However, to make absolutely sure that the margins are adequate despite small variations of page positioning, we will use slightly smaller value, by a tenth of an inch.
For single-sided printing, `\oddsidemargin` specifies the left margin on all pages; in duplex printing it specifies the left margin on odd-numbered pages. For the convenience of duplex drafts, `\evensidemargin` specifies the left margin on even-numbered pages. Subtracting the 1″ offset for the reference point leaves us with these values:

\begin{verbatim}
\setlength{\oddsidemargin}{0.5in}
\setlength{\evensidemargin}{0in}
\end{verbatim}

8.2. Vertical dimensions

The specification states that top and bottom margins must be at least 1″. The reference point for a LaTeX page is 1″ right of the left edge of the paper and 1″ below the top edge, so the logical margin of zero we specify here gives a physical margin of 1″.

In LaTeX, one does not directly specify the bottom margin; one instead specifies the paperwidth and several vertical dimensions, and the bottom margin is whatever vertical space is left over. First let’s consider the height of the header and footer parts of the page.

The specification says nothing about running headers or footers, except for page numbering.

- Preliminary pages display the page number centered at the bottom of the page in lowercase Roman numerals, except for certain pages that display no page number.
- The page number on body and back matter pages must be Arabic. It may appear either in the header or the footer, and may be centered or located at the outside (unbound) edge.

For consistency, this style will default to bottom centered page numbers. The author can always override it with explicit commands at the beginning of the body. This means we can eliminate the header altogether, freeing up more space for page content.

- `\topmargin` specifies the top margin from a point that is already 1″ from the top edge of the paper, so we’ll set that to zero.
- `\headheight` is the height of the header, and `\headsep` the vertical distance between the header and page body. We’ll set those to zero as well.
- `\textheight` is the height of the text body proper.
- `\footskip` is the vertical distance from the bottom of the body to the bottom of the footer. Assuming that the specification’s general rule about double-spaced text holds here, this should be 24 points, or two lines of 12-point type.

The total available height of the page is 11″ minus two 1″ margins or 9″. At 72.27 points per inch, that’s 650.43 points. Subtracting the 24 points for the footer gives us a body size of just over 626 points. However, to make sure that the margins are sufficiently wide, we will reduce that by a small value.

\footnote{http://www.nmt.edu/tcc/help/pubs/nmtthesis/latex/}
To insure that the ascenders on the first line of body type don’t get too close to the top edge, we specify a 24-point \topskip value; this dimension does not reduce the height of the body.

\setlength{\topskip}{24pt}

8.3. Control of leading

Note

In December 2013, the Graduate Office changed their policy to recommend single-spacing. Hence, the \titlepage command will set single-spacing, and it will carry through the rest of the document. This change makes the template v1.3; see Section 6, “Prologue to the LaTeX style file” (p. 5).

The Graduate Office specification discusses where and when the text should be single- or double-spaced. There are two commands that set interline spacing in LaTeX:

\setlength{\baselineskip}{leading}

Sets the minimum leading (baseline-to-baseline vertical spacing) to leading.

\renewcommand{\baselinestretch}{factor}

Multiplies the leading by factor; the default value is 1.0.

The problem with using \baselinestretch to achieve double-spacing is that it also affects footnotes, while the Graduate Office stipulates that footnotes must be single-spaced.

Furthermore, we cannot directly set \baselineskip within the preamble (where the \usepackage{nmthesis2013} will be executed), because the \begin{document} resets it to the default value for the document class.

Therefore, we are left with the problem of managing the \baselineskip value as various of our commands are executed. Here is the plan:

• The dedication environment will manage its leading inside a local group.

• Section 10.2, “\titlepage” (p. 14) will set up double-spacing. This will continue as the default through the balance of the document.

• Any additional commands that use single-spacing must confine their changes to \baselineskip within local groups. Environments automatically localize any changes to \baselineskip.

Two internal functions can be invoked to change the leading: Section 13.5, “\double@spacing: Set up double-spaced lines” (p. 32) and Section 13.10, “\single@spacing: Set up single-spaced lines” (p. 35).
8.4. Page numbering

In general, the front matter displays lowercase Roman numeral page numbers, and each page starting with the first chapter displays an Arabic page number starting with one.

The title page is considered page “i”, but displays no number. Several front matter pages (dedication, abstract, and signature pages) display no page number and are also not counted in the page numbering scheme.

The first displayed page number is “ii”, and will occur on the acknowledgments page if there is one; otherwise the first page of the table of contents displays that number.

Here are the locations where the page number or style is changed:

• In Section 10.2, “\titlepage” (p. 14), the page numbering style is set to “roman”, which also resets the page counter to 1.
• In Section 10.5, “The abstract environment” (p. 17), after the last page of the abstract is forced out, the page number is set to 2 so that the next numbered page (either the acknowledgments or the table of contents) will display “ii”.
• In Section 10.6, “The acknowledgments environment” (p. 18), the page counter is set to 2 so that the first page of the acknowledgments will carry page number “ii”.
• The transition from front matter to body matter is signified by the first \chapter command, at which point we use \pagenumbering{arabic} to change to Arabic page numbering and reset the page number to 1.

The old stylesheet tested for the first chapter by comparing the chapter counter to one. However, we stipulate in the user’s guide that the Graduate Office allows an initial unnumbered chapter entitled “INTRODUCTION”. This means there may be two invocations of the \chapter command when the chapter counter is equal to one.

Therefore, we will use a Boolean switch named \inbody to control when the page numbering is reset. This switch will be initialized to false here. In Section 11.1, “\chapter” (p. 23), if the switch is still false, the page numbering will be reset to Arabic, and the \inbody switch will be set to true.

\begin{verbatim}
\setboolean{inbody}{false}
\end{verbatim}

8.5. Paragraph dimensions

For a discussion of paragraph formatting, see Section 4.2, “Paragraphs” (p. 4).

\begin{verbatim}
\setlength{\parindent}{3pc}
\setlength{\parskip}{5pt plus1.5pt minus0.5pt}
\end{verbatim}

\begin{verbatim}
\% The 'inbody' switch is set true during the first \chapter.
\% \newboolean{inbody}
\setboolean{inbody}{false}
\end{verbatim}

http://www.nmt.edu/tcc/help/pubs/nmtthesis/latex/body.html#chapter
9. Preamble declarations

Most of these declarative commands work by defining an internal command that is referred to later during processing of the body of the document.

9.1. \author

The argument is the author's name, in mixed case. This command defines an internal command \author@ that is referenced by:

- Section 10.1, “The dedication environment” (p. 13).
- Section 10.12, “The preface environment” (p. 22).
- Section 10.11, “\signaturepage” (p. 20).
- Section 10.2, “\titlepage” (p. 14).

\begin{verbatim}
\renewcommand{\author}[1]{% #1 is the author's name in mixed case.
\newcommand{\author@}{#1}%
}% End \author
\end{verbatim}

9.2. \chair

This command defines the name of the committee chairperson. It defines the internal command \chair@. Formerly there was a separate \cochairs command, with two arguments, that defined two co-chairpersons, and the second name was saved as \second@chair. However, Dave Johnson of the Graduate Office has stated that this is not allowed: there must always be one and only one chairperson. The command remains here in case this ruling is ever reversed, and because the author was too lazy to remove it.

\begin{verbatim}
\providecommand{\chair@}{}
\providecommand{\second@chair}{}
\newcommand{\chair}[1]{% \renewcommand{\chair@}{#1}%
}% End \chair
\end{verbatim}
9.3. \committeesize

Defines an internal command \committeesize that is referenced by Section 10.11, “\signaturepage” (p. 20).

```latex
\newcommand{\committeesize}[1]{\newcommand{\committee@size}{#1}}
```

9.4. \degree: Kind of degree

Defines an internal command \degree that is referenced by Section 10.2, “\titlepage” (p. 14).

```latex
\newcommand{\degree}[1]{\newcommand{\degree@}{#1}}
```

9.5. \graduationdate

Defines an internal command \graduationdate that is referenced by:

- Section 10.1, “The dedication environment” (p. 13).
- Section 10.12, “The preface environment” (p. 22).
- Section 10.2, “\titlepage” (p. 14).

The purpose of the \providecommand is to insure that \graduationdate is defined, so that both explicit and default definitions can use \renewcommand.

```latex
\providecommand{\graduationdate}{}
\newcommand{\graduationdate}[1]{\renewcommand{\graduationdate}{#1}}
```

This command is optional, so we also define a default \graduationdate command that uses the current month and year to guess the date. This command assumes that months 1–5 imply a May graduation date; months 6–8, August; and months 9–12, December.

The commands \month and \year are Plain TeX. I could not find any LaTeX equivalents.

Each of these commands defines a new command \thesis@type that is referenced by Section 10.6, “The acknowledgments environment” (p. 18). This command contains the lowercased name of the report type.

\thesis

9.7. \title: Define the overall title

This command defines an internal command \title@ that is referenced by Section 10.2, “\title-page” (p. 14).
9.8. \typist

Creates an internal command \typist@ that is referenced by Section 10.6, “The acknowledgments environment” (p. 18). We provide a default definition as “the typist”.

10. Commands used in front matter

These commands are presented in the order in which they occur in the body of the work.

10.1. The dedication environment

Here are the style features required by the Graduate Office for this optional feature.

• The page does not display a page number, and is not counted in the page numbering.
• The body of the dedication is single-spaced.
• The text is centered both vertically and horizontally.

The old version of the stylesheet also automatically skips about 3 picas, then sets three lines flush right: the author’s name; the university’s name, in slanted type; and the month and year, also in slanted type.

We start by going to a new page with a \clearpage, and setting the current page style to empty (no header or footer). Then we set the \baselineskip to single-space the contents (see Section 13.10, “\single@spacing: Set up single-spaced lines” (p. 35)). Vertical centering is achieved by using a non-discardable vertical fill at the top of the page and another fill at the bottom. Lastly, start a centering environment.
10.2. \titlepage

Reviewing the Graduate Office’s requirements for title pages, the only strict style rules are that the title must be in all capital letters, each line centered, and the remaining lines are in mixed case.

Analysis of the old stylesheet, and measurement of the Goudy dissertation output, yield this scheme for the title page layout, in order from top to bottom.

- The top margin appears to be a bit more than 2”. Because the \center environment adds about a pica of vertical space before and after, we can insure this margin with an explicit non-discardable vertical space of 1”.

- A localizing environment encloses the page contents. Inside it as a \centering command to insure that all the text lines on the page are centered. We use this instead of the \center environment, which adds an unknown amount of vertical space above and below itself.

- For the title lines, the Graduate Office permits 14-point type. The old stylesheet also boldfaces these lines. Goudy’s dissertation shows that the old template single-spaces multiple lines within the title.

- The word “by” is on a line by itself with space above and below it.

- The author’s name comes from the \author@ command defined in Section 9.1, \"author\" (p. 10).

- Since the remaining material seems to be pushed to the bottom of the page, we’ll use a vertical fill at this point.

- Two lines of boilerplate: “Submitted…” and “of the Requirements…”.

- The name of the degree. This comes from the \degree@ command created by Section 9.4, \"degree: Kind of degree\" (p. 11).

- A vertical space of about 3 picas.
• At page bottom are three centered lines giving the university’s name, the city and state, and the
graduation date. This is followed by a \pagebreak[4] command to finish the page without adding
vertical fill.

First we set up single-spacing, which since December 2013 is the default leading for the entire document;
see Section 13.10, “\single@spacing: Set up single-spaced lines” (p. 35). We specify lowercase Roman
numeral page numbers, then use \thispagestyle to suppress the numeral “i” that would otherwise
appear. Single spacing is set inside the title; see Section 13.10, “\single@spacing: Set up single-spaced
lines” (p. 35).

Because some users expect \maketitle to work correctly, we redefine that command as equivalent
to \titlepage.
10.3. The \epigraph command

The format specification says the epigraph should be on an unnumbered page with no heading. The epigraph will be centered horizontally and vertically. If there is an attribution, it is right-aligned below the epigraph.

The command has one optional argument, the attribution; and one required argument, the epigraph.

\begin{center}
\parbox{4in} {
\begin{flushright}
#1
\end{flushright}
}\end{center}

We use the \ifthenelse construct to test whether the optional attribution argument was used. If so, the attribution is set flush right a little further down the page.

\begin{flushright}
#1
\end{flushright}
\vfill
\pagebreak[4]

10.4. The \frontispiece command

The frontispiece is intended to display a single graphic, optionally followed by a centered title. The optional argument #1 is the title; the graphic is the required argument #2.
10.5. The abstract environment

The abstract section is mandatory. It displays no page numbers and is not counted in page numbering. The title “ABSTRACT” is to appear horizontally centered, two inches from the top of the page. The text begins on the fourth line below the heading and is double-spaced.

Start a new page and force the empty page style to suppress any header or footer.

The heading is generated by Section 13.8, “\make@majorhead” (p. 33).

The epilogue has a \par command to force termination of the last paragraph.
There is one other important action to be taken at the end of the abstract. Page numbering must resume after the abstract so that the following page is numbered “ii”. The following page may be either the acknowledgments (see Section 10.6, “The acknowledgments environment” (p. 18)) or the table of contents.

The \keywords command is used inside the abstract environment to provide keywords or key phrases.

\section*{10.6. The acknowledgments environment}

This environment starts a new page entitled ACKNOWLEDGMENTS. It will be numbered in lowercase Roman numerals.

First we use \clearpage to force a new page. Page numbering is turned on and the style set to lowercase Roman numerals. The heading is composed by Section 13.8, “\make@majorhead” (p. 33). The @afterheading command is part of the stock stylesheets and does post-heading cleanup.

The epilogue for this environment adds a paragraph acknowledging the typesetting system, with a footnote acknowledging the base tools and the writer of the stylesheet. The \thesis@type command is defined by one of the commands discussed in Section 9.6, “Report type selection commands: \thesis, etc.” (p. 12). The \protect command is necessary so that the footnote is not attached until the actual invocation of the epilogue.
The \protect\footnote{}{Start footnote
The \LaTeX{} document preparation system was developed by Leslie Lamport as a special version of Donald Knuth's \TeX{} program for computer typesetting. \TeX{} is a trademark of the American Mathematical Society. The \LaTeX{} macro package for the New Mexico Institute of Mining and Technology \thesis@type{} format was written for the Tech Computer Center by John W.\ Shipman.\%
}End footnote

The \protect\typist@{} command is set in Section 9.8, \"\typist\" (p. 13). Then the page counter is set so that this page will display page number \"ii\".

\by \protect\typist@{}.
\par
}% ack epilogue

10.7. \texttt{\tableofcontents}
To display the heading, we use \clearpage to start a new page, then call Section 13.8, \"\make@majorhead\" (p. 33). The \@starttoc command is from the stock stylesheets.

% - - - \tableofcontents
% \renewcommand{\tableofcontents}\
{%
\clearpage
\make@majorhead{CONTENTS}\
\@starttoc{toc}\
}%

10.8. \texttt{\listoftables}
Similar to Section 10.7, \texttt{\tableofcontents} (p. 19), but it takes it input from the .lot file. We use an \internal@chapter* command to treat this section like an unnumbered chapter.

% - - - \listoftables
% \renewcommand{\listoftables}\
{%
\internal@chapter*{LIST OF TABLES}\
\@starttoc{lot}\
}% End \listoftables
10.9. \listoffigures

Similar to Section 10.8, “\listoftables” (p. 19),

\renewcommand{\listoffigures}{%\internal@chapter*{LIST OF FIGURES}\@starttoc{lof}}% End \listoftables

10.10. \listofabbrs

As stated in the user’s guide\textsuperscript{12}, this section is not like a table of contents or list of figures. It uses an \input command to read a file named abbrs.tex, which the author hand-builds, probably using a tabular environment.

\providecommand{\listofabbrs}{}\renewcommand{\listofabbrs}{% List of abbreviations (including acronyms)\internal@chapter*{LIST OF ABBREVIATIONS}\input{abbrs}}% End \listofabbrs

10.11. \signaturepage

The number of people who need to sign is given by the \committeesize command. The first signature line is for the chair or co-chairs, and displays the name or names under it. The remaining lines are for the other committee members, and do not display the names beneath.

For the preamble commands that set up the signature page, see:

- Section 9.2, “chair” (p. 10) defines commands \chair@ and \second@chair.
- Section 9.3, “committeesize” (p. 11) defines \committee@size.
- Section 9.1, “author” (p. 10) defines \author@.
- Section 9.6, “Report type selection commands: thesis, etc.” (p. 12) defines \thesis@type.

Here is the main \signaturepage command. Before the actual command we define a new counter signature@count that will be used to compute the number of signature lines after the line where the chair or co-chairs sign.

\newcounter{signature@count}%

\textsuperscript{12}http://www.nmt.edu/tcc/help/pubs/nmtthesis/latex/front-matter.html#listofabbrs
First we go to a new page with \clearpage, and specify an empty page style. The page counter is decremented so that this page will not count in the page numbering scheme. A non-discardable 1″ vertical skip guarantees a two-inch top margin.

Next comes a boilerplate paragraph, and an extra blank line. The localized \sloppy command prevents a word break in the middle of the word “committee.”

Next comes the signature line for the chair or co-chairs. For the actual signature blank, see Section 13.9, “\sign@here: Signature line” (p. 34). The text under this blank depends on whether there is a co-chair:

- If there is no co-chair, the text is “CHAIR, Advisor”.
- If there is a co-chair, the text is “CHAIR and CO-CHAIR, Advisors”. (Note: This feature is currently deprecated by the Graduate office; see Section 9.2, “\chair” (p. 10).)

While we’re distinguishing between these two cases, we also set the value of the signature@count variable to the number of signature blanks that remain to be displayed after the chair blank. If the writer uses a \chair command, the \chair@ command is defined as the chair’s name, and the number of unlabeled signature blanks is one less than \committee@size. If they used a \cochairs command, the \chair@ command is defined as the first co-chair’s name and \second@chair to the second, so the number of unlabeled signature lines is two less than \committee@size.

After another small vertical space, we produce signature@count copies of the signature blank.
Next comes a \vfill that expands to fill all the remaining vertical space on the page, so that the signature blank for the author will be at the bottom.

Located at the bottom of the page are another boilerplate paragraph, and the student's signature blank, with the author's name and the word “Date” at opposite sides of the page.

10.12. The preface environment

This environment is part of the front matter, so it is numbered with lowercase Roman numerals. Structurally it is similar to Section 10.5, “The abstract environment” (p. 17), except for page numbering.

The final \clearpage is necessary because the preface must have lowercase Roman page numbering. The next user command is supposed be a \chapter, so we want to number the last page of the preface before the switch to Arabic page numbers.

\clearpage
% preface epilogue
11. Commands used in the document body

The dividing line between the front matter and the body of the thesis is the occurrence of the user’s first \chapter command.

11.1. \chapter

Although this command nominally requires an argument, the definition here seems to require zero arguments. However, it uses the \secdef command which looks for a "*" following the command name and then processes the argument.

There is no explicit command that starts the body section of the document, when the page numbering starts over with Arabic numeral 1. The Boolean switch inbody is used to control this event; see Section 8.4, “Page numbering” (p. 9).

The rest of the processing is handled in Section 13.6, “\internal@chapter” (p. 32), including the call to the \secdef command.

11.2. \section

For design considerations of the \section command, see Section 4.1, “Sectioning commands” (p. 4). For the internal command @startsection, see Section 14, “Calling @startsection” (p. 35).

We’ll define internal lengths \pre@sectionskip and \post@sectionskip that are used in both \section and \subsection.
11.3. \subsection and \subsubsection

See Section 4.1, “Sectioning commands” (p. 4). This command is similar to Section 11.2, “\section” (p. 23), where the \pre@sectionskip and \post@sectionskip lengths are defined.

11.4. \subsubsection

Compare Section 11.2, “\section” (p. 23), and see also Section 4.1, “Sectioning commands” (p. 4) and Section 14, “Calling \@startsection” (p. 35).

We use a negative length for the fifth (after-skip) argument, which forces a run-in heading; the absolute value of this argument is used as a space between the heading and the first word of the paragraph.

11.5. \appendix

This command signifies the start of the appendices to the main thesis body. It performs these operations:

- It resets the chapter counter so that appendices will be labeled A, B, C, ....
- The \chapter@orappendix command, which was defined as “CHAPTER” in Section 13.3, “\chapter@orappendix” (p. 31), is redefined as “APPENDIX”.
- It redefines \thechapter to use uppercase letters instead of Arabic numerals.
11.6. The References environment

Encloses the References (bibliography) section.

Two internal definitions and an internal length are shared by this environment and Section 11.7, “The Bibliography environment” (p. 26); all three are referenced by Section 13.1, “The bib@list environment” (p. 29).

• The \bib@title command is defined by this environment as “REFERENCES”, and by the Bibliography environment as “BIBLIOGRAPHY”.
• The \bib@sample command stores the optional argument to this environment for later use. This argument is empty for the author-year citation style; for numeric citations, it is the sample citation number, e.g., “99” for two-digit citation numbers.
• Length \bib@margin is the size of the hanging indent used in the reference entries for the author-year citation style.

For the page title and style changes, see Section 11.8, “The thebibliography environment” (p. 26).
The section title is passed to the \{thebibliography\} environment via the internal \texttt{\bib@title} command. The optional argument passed to this environment is saved in the command \texttt{\bib@sample}. Then we force a new page. The epilogue does nothing but force a new page.

\begin{verbatim}
\renewcommand{\bib@title}{REFERENCES}\
\renewcommand{\bib@sample}{#1}\
\clearpage\
\end{verbatim}

11.7. The Bibliography environment

Structurally identical to Section 11.6, “The References environment” (p. 25) except for the section title.

\begin{verbatim}
\newenvironment{Bibliography}[1][1][]\
\begin{verbatim}
\renewenvironment{thebibliography}[1][1][1][]\
\begin{verbatim}
\chapter*{\bib@title}
\end{verbatim}
\end{verbatim}
\end{verbatim}

11.8. The thebibliography environment

This environment is used by BibTeX in the .bbl command that it produces.

The command starts by generating an unnumbered chapter entitled “REFERENCES”. It takes one argument, the label width example, which is ignored in our style, because it is provided as an argument to the \{References\} or \{Bibliography\} environment.

\begin{verbatim}
\renewenvironment{thebibliography}[1][1][1][]\
\end{verbatim}

The title of the unnumbered, chapter-level heading comes from the \texttt{\bib@title} command set in the \{References\} or \{Bibliography\} environment.

\begin{verbatim}
\chapter*{\bib@title}
\end{verbatim}
To format the entries, we use the internal environment described in Section 13.1, “The \bib@list environment” (p. 29).

\begin{verbatim}
\begin{bib@list}
\% thebibliography prologue
{\% thebibliography epilogue
\end{bib@list}
\% thebibliography epilogue
\end{verbatim}

11.9. The \copyrightpage command

The purpose of this command is to produce a page with a copyright statement.

\begin{verbatim}
\providecommand{\copyrightpage}{}
\renewcommand{\copyrightpage}{% Produce a copyright page. No arguments.
\clearpage
\begin{center}
\centering
\single@spacing
\title@
\vspace{1pc}
by\[1pc
\author@
\end{center}
\vspace*{\fill}
\begin{quotation}
\single@spacing
Permission to make digital or hard copies of all or part of
this work for personal or classroom use is granted without fee
provided that copies are not made or distributed for profit
or commercial advantage and that copies bear this notice and
the full citation on the last page. To copy otherwise, to
republish, to post on servers or to redistribute to lists,
requires prior specific permission and may require a fee.
\end{quotation}
\vfill
\end{verbatim}

12. Per-chapter features

These features are used in chapters that have been published separately.

12.1. The \chapterabstract environment

Per-chapter abstract.

\begin{verbatim}
% % - - - \{ chapterabstract \}
%
\end{verbatim}
12.2. The chapterack environment

Per-chapter acknowledgments. The environment generates an unnumbered section titled “acknowl-
dgments”.

12.3. The chapterappendices environment

Per-chapter appendices.

The section counter is reset to zero, and the section numbering style is changed to uppercase letters. The epilogue changes section numbering back to Arabic, in case there are any more sections.
12.4. The chapterbibliography environment

Similar to the Bibliography environment, but the heading is at section level, and the word “Bibliography” is not capitalized. See Section 13.1, “The bib@list environment” (p. 29) for the styling.

First we generate an unnumbered section-level heading. Then the argument (if any) is saved in the internal \bib@sample command, which is used by the \{bib@list\} environment.

13. Internal commands

These commands are used only within this package. Their names all contain at least one “@”. They are shown here in alphabetical order for quick reference.

13.1. The bib@list environment

This environment sets up the special bibliography list style.

We use the generic list environment to format the bibliography entries. For a general discussion of the paragraph shapes for the two different citation styles, see Section 4.3, “Formatting bibliography entries” (p. 4).

The \begin{list} takes two arguments. The first argument is the default label to be attached to list items that do not use the first, optional argument; this is empty in our case. The second argument contains commands that change the shape of the items.

The enumiv counter is used to number entries when citations are by number.
Several dimensions are different depending on the citation style. If the \bib@sample command set by the \{Reference\}, \{Bibliography\}, or \{chapterbibliography\} environment is empty, we set up the author-year paragraph shape. If \bib@sample is not empty, it contains a template for the largest citation number; in that case we set up the numbered citation paragraph shape.

The \sloppy command allows LaTeX to set the entries more loosely. The \frenchspacing command instructs LaTeX to use a normal-sized space after a period. Single-spacing is set up by Section 13.10, \"single@spacing: Set up single-spaced lines\" (p. 35). At the end of the list environment, we re-assert double-spacing; see Section 13.5, \"double@spacing: Set up double-spaced lines\" (p. 32).

\begin{Verbatim}
\sloppy
\frenchspacing
\single@spacing
\end{Verbatim}

13.2. \chapter@

The \chapter@ command implements the full \chapter command. Again, most of this code is taken from the stock stylesheet.

Although this LaTeX definition has an optional argument, the \secdef command will always provide it (see Mittelbach, p. 32).

\begin{Verbatim}
\newcommand{\chapter@}[2][]\%
\{\%  Generate a numbered chapter heading.
\end{Verbatim}
13.3. \chapter@orappendix

The internal command \chapter@orappendix is initially defined as “CHAPTER”. It is redefined as “APPENDIX” in Section 11.5, “\appendix” (p. 24).

13.4. \chapter@star: The \chapter* command

This command starts a new chapter but does not display a chapter number or increment the chapter counter. It does these things:

- Adds a line to the table of contents displaying the chapter title (but not the chapter number). The \addcontentsline command takes three arguments: toc for the table of contents; chapter to use the chapter counter; and the third argument is the chapter title.
- Generates the heading by calling Section 13.8, “\make@majorhead” (p. 33).
- The \@afterheading does post-heading cleanup, and is taken from the \@schapter command in the stock stylesheets.
13.5. \double@spacing: Set up double-spaced lines

\newcommand{\double@spacing}{\setlength{\baselineskip}{2em plus0.1em minus0.1em}}

13.6. \internal@chapter

This command accomplishes much the same as the user-level \chapter command, with one important difference: it does not set the inbody flag that triggers the start of Arabic page numbering.

The first part of this command is taken directly from the definition of \chapter in the stock stylesheet report.cls. The \clearpage command clears old floats and starts a new page. The \global{\@topnum}\z@ command prevents new floats from being placed at the top of the new page.

\newcommand{\internal@chapter}{% Start a new chapter
  \par
  \clearpage
  \global{\@topnum}=\z@}

The stock stylesheet has \@afterindentfalse here, which suppresses indentation of the first paragraph of a section. However, we want the first paragraph indented.

\@afterindenttrue

The \secdef command is used in the stock stylesheets to dispatch further processing to either of two commands, depending on whether the document used the \chapter or \chapter* form. See the Mittelbach book, p. 32, for more on \secdef.

- For the \chapter form, it will call Section 13.2, “\chapter@” (p. 30).
- For the \chapter* form, see Section 13.4, “\chapter@star: The \chapter* command” (p. 31).

It is necessary to implement the \chapter* in order to allow the two unnumbered chapters that the Graduate Office specification allows: an initial “INTRODUCTION” chapter and a final “CONCLUSION” chapter.
13.7. \makechapterhead

This command formats just the heading of a new chapter.

As with the standard LaTeX \chapter command, we check the secnumdepth counter: if it is nonnegative, we must first display either “Chapter N” or “Appendix N” first. In any case, the chapter’s title text is displayed single-spaced and centered in large bold type.

13.8. \makemajorhead

This command formats all the large headings that start on a new page: abstract, chapter, appendix, etc. Here is the general form of invocation:

\makemajorhead[\textlt]{\textrt}

\textlt This optional argument is used for the first part of two-part headings such as “Chapter 3” or “Appendix C”.

If present, this part is set in centered, large, boldface type, and with a double-space after it.
**mainhead**

For chapter or appendix titles, this is the actual title of the unit. For other major headings, it is the heading text, e.g., “ABSTRACT”.

This part is set in centered, large, boldface type, and with a double-space after it. If it contains multiple lines, they are single-spaced.

The specification states that the following text will start on the fourth single-spaced line after the last line of the heading. Since the default leading is double-spaced, this means the final vertical skip is 1.5 times the current leading.

First we skip an extra half-inch to get the specified 2” top margin. Then we start a group to localize the style changes: no paragraph indentation; all lines centered; boldface; and larger type.

If the optional *tophead* argument was given, display it here, followed by an extra blank line.

Now display the *mainhead* text, strongly discourage a page break here, and skip 1.5 lines.

---

**13.9 \sign@here: Signature line**

This command generates one of the signature blanks for Section 10.11, “\signaturepage” (p. 20).
Inside the \makebox command that stretches its content to the current text width, we first place a strut, an invisible box that establishes the height and depth of the space around the line. To get half an inch (about 36 points) between signature lines, we’ll use a height of 28 points and a depth of 8 points. The \hrulefill command will create a horizontal rule filling the remainder of the line.

\begin{verbatim}
\rule[-8pt]{0pt}{36pt}% Strut
\hrulefill
\par
\end{verbatim}

13.10. \single@spacing: Set up single-spaced lines

\begin{verbatim}
\newcommand{\single@spacing}{}
\setlength{\baselineskip}{1em plus0.1em minus0.1em}
\end{verbatim}

14. Calling \@startsection

From an excellent tutorial page\textsuperscript{13}, we find that the \@startsection command is used by all the various sectioning commands. This command is defined in the latex.ltx file.

It takes six arguments.

\begin{description}
\item[{NAME}] Name of the section command, e.g., \{paragraph\}.
\item[{LEVEL}] Depth of the section command, e.g., 0 for part, 1 for chapter, 2 for section. This value is compared to the secnumdepth and tocdepth counters to control numbering of sections and the depth of the table of contents.
\item[{INDENT}] How far the heading should be indented. For no indent, use “\z@”, shorthand for zero points.
\item[{BEFORESKIP}] If positive, the vertical rubber length to be inserted before the heading.
\item[{AFTERSKIP}] If positive, the vertical rubber length to be inserted after the heading.
\end{description}

\textsuperscript{13}http://help-csli.stanford.edu/tex/latex-sections.shtml
If negative, use a run-in heading (make it the first part of the first paragraph), and insert its absolute value as horizontal space between the heading and the next word of the paragraph.

{STYLE}
Commands that alter the style of the heading.

15. Revision history

Here are the version strings from the \ProvidesPackage command, in reverse chronological order.

[2013/02/26 v1.2]
Add the \copyrightpage command.

[2010/03/20 v1.1]
Added the \keywords command at the request of Skeen Library.
Remove the \cochairs command. Dave Johnson ruled that there must be one and only one chairperson per thesis.

[2009/12/01 v1.0]
Initial release.