

Thesis and Dissertation Class Files

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1 Preface

1.1 File Description

Simply \LaTeX the `theses.ins` file to generate the class file `mstogs.cls`. This documentation file (`theses.dtx`) can be typeset by running it through \LaTeX . The class defines commands which allow the formatting of a thesis (or dissertation) based on the \LaTeX report class or based on the campus-termed Publication Thesis Option.

A companion template, contained in files `ths.dtx` and `ths.ins`, provides templates illustrating the use of the class file for these two thesis styles.

Very important: the `<ps>` characters which appear in the code are simply a placeholder for a percent sign (\LaTeX comment character). These characters are used so that during the generation of the code output, these lines are not removed. Bottom line, after \LaTeX 'ing the `ths.ins` file, do a replace all for `<ps>` with `%` to obtain a proper \LaTeX file.

1.2 Limitations and Bugs

Resolved (Originally added: 2011/11/03). The first page of each individual appendix in a thesis with multiple appendices is not correctly generated in \LaTeX . At the moment, this would require generating these pages outside of \LaTeX . The associated class file will need revision in order to make these pages generate with the correct formatting.

Resolved 2014/10/21 (Originally added 2014/08/13). The word SECTION does not appear above the first \LaTeX chapter of the thesis and the first chapter following the publication chapters, as requested by OGS.

1.3 Acknowledgments

This class file is the product of significant effort from a number of contributors. A special thanks to the Office of Graduate Studies during Summer 2014 for their willingness to begin the process of helping to define and support an official version of the class file: Dr. Allada, Vicki Hudgins, Lauren Costoplos and Sharon Matson.

A special additional thanks to Sharon Matson, Kathy Wagner and Jade Sinnott for their efforts to define a new campus thesis/dissertation specification, provide reviews of the \LaTeX template and finally, for carrying this new specification through to formal campus approval.

A special thanks to Phil Thiem (Mathematics) for his very careful review of the class file in Fall 2011. His suggested improvements have produced a class file which very accurately follows the current Missouri S&T spec. In particular, he was able to resolve the distinct formatting requirements for single versus multiple appendices.

An additional thanks to Ben Payne (Physics) for his careful review of the class file and his work in helping to match the formatting guidelines being adopted by OGS in Spring 2012.

2 Missouri University of Science & Technology

2.1 Identification

```
<*mstogs>
\NeedsTeXFormat{LaTeX2e}
\ProvidesClass{mstogs}[2018/08/07 v4.0 %
    Missouri S&T Office of Graduate Studies Thesis/Dissertation Class]
```

2.2 Initial Code

The `ifthen` package is loaded and the following boolean variables defined:

timesfree used to select the Times Roman fonts which are publically available.

timescomm used to select the commercially-available fonts from MathTime Pro. Note that these are not part of an open-source L^AT_EX installation.

double used to specify double or single spacing (the default). Because of a quirk in the `setspace` package, the variable gets used in the actual `thesis.tex` file, not in the class file. The default is single spacing.

onehalf used to specific one-and-one-half spacing.

```
\RequirePackage{ifthen}[2001/05/26]
\newboolean{timesfree}
\newboolean{timescomm}
\newboolean{double}
\newboolean{onehalf}
\newboolean{firstThesisOnlyChapter}
\newboolean{lofHeading}
\newboolean{lotHeading}
```

2.3 Declaration of Options

The following options are defined for the class:

10pt, **11pt**, **12pt** these options are passed directly to the document class.

times selects the publically-available Times Roman fonts for both the text and the mathematics.

timesmtp selects commercial Times Roman and MathTime fonts for the text and math fonts, respectively. Only use this option if the MathTime fonts have been purchased and installed in your local texmf tree.

doublespace selects doublespacing.

onehalfspace selects one and one-half spacing.

```

\DeclareOption{10pt}{%
\PassOptionsToClass{10pt}{report}%
}

\DeclareOption{11pt}{%
\PassOptionsToClass{11pt}{report}%
}

\DeclareOption{12pt}{%
\PassOptionsToClass{12pt}{report}%
}

\DeclareOption{times}{%
\setboolean{timesfree}{true}%
}

\DeclareOption{timesmtp}{%
\setboolean{timescomm}{true}%
}

\DeclareOption{doublespace}{%
\setboolean{double}{true}
}

\DeclareOption{onehalfspace}{%
\setboolean{onehalf}{true}%
}

% UMR option chap
\newif\ifchap % true for chap option
\chapfalse % false by default
\DeclareOption{chap}{\chaptrue} % option to print "Chapter" at each new chapter

```

2.4 Execution of Options

```
\ProcessOptions
```

2.5 Package Loading

Prior to obtaining the MathTime fonts package, I had used `\RequirePackage{times,mathptm,pifont}` to get times font for both the text and math.

Update (2011/10/26): the first three commands used with the MathTime Pro fonts have nothing to do with the purchased fonts. These simply use the publically-available Times fonts from Adobe. The difference then, is in the companion math fonts.

(2015/02/20): The `newtx` package provides Times Roman fonts which are superior to the `mtpro2` commercial fonts so I have changed both the `timescomm`

and `timesfree` options to being identical and both accessing the same `newtx` package.

```
\LoadClass{report}

\ifthenelse{\boolean{timescomm}}{%
  \RequirePackage{newtxtext}[2015/02/12]
  \RequirePackage{newtxmath}[2015/02/13]
}{%}

\ifthenelse{\boolean{timesfree}}{%
  \RequirePackage{newtxtext}[2015/02/12]
  \RequirePackage{newtxmath}[2015/02/13]
}{%}
```

Normally the following gives 1-inch right and bottom margins. However, due to use of `\brokenpenalty` this is not always obeyed. A slight increase in the size of the margins can sometimes be sufficient to produce a result acceptable to the Graduate Studies office. A value of `9.37in` for example, instead of `9.5in`.

Revision Note (2015/01/07,koh): Graduate Studies is requesting a one-inch margin above any heading such as “ABSTRACT”. To achieve this, the headsep has been increased and the total textheight reduced. The settings below now produce the desired one-inch margin above the page heading while preserving the positioning of the pagination in the right-hand upper corner.

```
\RequirePackage{geometry}[2008/12/21]
\geometry{letterpaper,total={6in,8.995in}}
\geometry{top=1.03125in,headheight=0.125in,headsep=0.3125in,left=1.515in}

\RequirePackage[american]{babel}[2008/07/06]
\RequirePackage{setspace}[2000/12/01]
\RequirePackage{amsmath}[2000/07/18] % ,amssymb
\RequirePackage[indentfirst][1995/11/23]
\RequirePackage[noprefix]{nomencl}[2005/09/22]
```

The formatting of headings is an important part of the campus specification. In the chapter spacing for example, the `-0.5in` refers to the vertical spacing of the chapter in the body of the thesis.

(2014/08/13, koh). Inclusion of the `tocloft` and `etoolbox` commands provide for the forced uppercase in the \LaTeX section titles appearing in the table of contents.

(2021/02/20, koh). The most recent version of `titlesec` appears to cause a change in the line spacing behavior as the `toc/lof/lot` now are formatted completely as single spacing with no extra (doublespace) level of spacing between heading entries. The prior minimum version date was 2007/08/12. This is now being changed to that of the current version, and the additional changes necessary to produce the correct formatting will also have to be introduced.

(2021/03/24, koh) As requested by Kathy Wagner, reduced the spacing after the chapter heading by `0.25in`. The spacing was originally set to `0.6875in`, so I

reduced to 0.4375in. There were a total of three occurrences of this setting.

(2021/03/25, koh) Also requested by Kathy Wagner, reduce the spacing after the second-level headings (LaTeX = section). I am reducing the lead measurement by 0.5ex, from 2.3ex to 1.8ex. Two occurrences. Also changing the spacing of the second-level paper heading, this is subsection in LaTeX. Same change of 2.3ex to 1.8ex. Three occurrences. Noting that the current specification allows for up to 0.2ex of additional vertical space to be added as needed for stretching. I am going to adjust the 1.8ex down to 1.5ex which will hopefully give the visual reduction that Kathy Wagner seeks. The total number of these changes are now 5 occurrences.

```
\RequirePackage{titlesec}[2019/10/16]
\titleformat{\chapter}{\singlespacing\center\normalsize\bfseries\uppercase}%
  {\thechapter.}{.5em}{\doublespacing}
\titlespacing{\chapter}{0pt}{-0.4375in}{0.4375in}
\titleformat{\section}{\singlespacing\normalsize\bfseries\uppercase}%
  {\thesection.}{.5em}{\doublespacing}
\titlespacing{\section}{0pt}{3.5ex plus 1ex minus .2ex}{1.5ex plus .2ex}
\titleformat{\subsection}[runin]{\normalsize\bfseries}%
  {\thesubsection.}{0.5em}{. \hspace{0.5em}~}
\titlespacing{\subsection}{\parindent}{\parskip}{0pt}
\titleformat{\subsubsection}[runin]{\normalsize\bfseries}%
  {\thesubsubsection.}{0.5em}{. \hspace{0.5em}~}
\titlespacing{\subsubsection}{\parindent}{\parskip}{0pt}
\titleformat{\paragraph}[runin]{\normalsize\itshape}%
  {\theparagraph.}{0.5em}{. \hspace{0.5em}~}
\titlespacing{\paragraph}{\parindent}{\parskip}{0pt}
```

```
\RequirePackage[titles]{tocloft}[2017/08/31]
\RequirePackage{etoolbox}
```

```
\RequirePackage{fancyhdr}
\pagestyle{fancy}
\lhead{}\chead{}\rhead{\thepage}
\lfoot{}\cfoot{}\rfoot{}
\renewcommand{\headrulewidth}{0pt}
\renewcommand{\footrulewidth}{0pt}
```

```
%\RequirePackage[authoryear,sort]{natbib}[2000/07/24]
```

```
\RequirePackage[labelsep=period]{caption}[2011/11/02]
```

A special thanks to Wasim I. Kayani (2015/05/09) for the suggestion to make use of the nowidow package. He recommended use of the package with the following options:

```
\RequirePackage[defaultlines=3,all]{nowidow}
```

2.6 Main Code

The following was an initial attempt at being able to select the line spacing as a class option. However, for unknown reasons, it does not work. A similar mechanism has worked fine in other contexts.

```
\ifthenelse{\boolean{double}}%
{\newcommand{\paperbodysettings}{\doublespacing}}%
{\newcommand{\paperbodysettings}{}}

\ifthenelse{\boolean{onehalf}}%
{\renewcommand{\paperbodysettings}{\onehalfspacing}}%
{\renewcommand{\paperbodysettings}{}}

\def\nopagenumber{%
\thispagestyle{empty}%
}
```

The paragraph indent is set by the following single command.

```
\setlength{\parindent}{0.5in}
```

The numbering depth and inclusion in toc. Up until 2017 oct 04, only through subsubsections were numbered. Changed the secnumdepth addtcounter to 2 so as to number paragraph headings. 2018/10/14, koh: The secnumdepth counter has been changed back to 2 since the OGS format specs use paragraph as the fourth-level heading in a publication.

```
\setcounter{tocdepth}{3}
\addtocounter{secnumdepth}{2}
```

2.6.1 Title Page

Begin by defining an environment for the thesis title page. Two commands are introduced for specification of the thesis adviser(s). As of 2011/10/22, the co-adviser specification does not work correctly. If one uncomments the original command, cothadviser, and specifies a name in the brackets, the titlepage is typeset with the name of memberone as the coadviser. This will need some work down the road.

```
\newcommand{\ThesisAdvisor}[1]{\advisor{#1}}
\newcommand{\ThesisCommittee}[1]{\committee{#1}}

\newenvironment{ThesisTitlePage}[1]{%
\ifthenelse{\equal{#1}{ms}}%
{\thesistype{1}\GraduateDegree{MASTER OF SCIENCE}}%
{\thesistype{2}\GraduateDegree{DOCTOR OF PHILOSOPHY}}}%
{\titlepage}
```

This content is a shameless hack of a file obtained at UMR in 2003.

```

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% FOR RPI TITLEPAGE, ABSTR. TITLEPAGE & COPYRIGHT PAGE
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

```

```

\def\thesistitle#1{\gdef\@thesistitle{#1}}
\def@author#1{\gdef\@author{#1}}
% ... added koh, 2017/03/15 ...
\def\advisor#1{\gdef\@advisor{#1}}
\def\committee#1{\gdef\@committee{#1}}
\newcount\numdeg \numdeg=1
\def\thesistype#1{\numdeg=#1}
% ... end of added commands (koh, 2017/03/15) ...
\def\GraduateDegree#1{\gdef\@GraduateDegree{#1}}
\def\department#1{\gdef\@department{#1}}
\def\copyrightyear#1{\gdef\@copyrightyear{#1}} \copyrightyear{\the\year}
\def\graddate#1{\gdef\@graddate{#1}}

```

```
\newcount\numcount
```

```
\def\titlename{%
```

```
\ifnum\numdeg<2 \typeout{-----Masters Thesis-----}
```

```

\thispagestyle{empty}
\mbox{}\vspace*{\fill}
\begin{singlespace}
\begin{center}
\parindent=0pt
\vspace*{-0.25in} % ... koh (2011/09/06) ...
\begin{doublespace}
{\uppercase\expandafter{\@thesistitle}}\ \ [24pt]
by \ \ [24pt]
{\uppercase\expandafter{\@author}}\ \ [24pt]
\end{doublespace}
A THESIS \ \ [12pt]
Presented to the Graduate Faculty of the\ \ [18pt]
MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY\ \ [18pt]
In Partial Fulfillment of the Requirements for the Degree\ \ [24pt]
\uppercase\expandafter{\@GraduateDegree}\ \ [18pt]
~in~\ \ [18pt]%
\uppercase\expandafter{\@department} \ \ [18pt]
\@graddate\ \ [18pt]
Approved by:\ \
\vspace*{0.375in}
\end{center}
\begin{center}

```



```

\begin{minipage}{5in}
  \begin{center}\begin{onehalfspacing}
    \@advisor\\
    \@committee\\
  \end{onehalfspacing}\end{center}
\end{minipage}
\end{center}
\end{singlespace}
\vspace*{\fill}
\newpage
\pagestyle{myheadings}
\pagenumbering{roman}
\setcounter{page}{2}

\else \typeout{-----Doctoral Thesis-----}

\thispagestyle{empty}
\mbox{}\vspace*{\fill}
\begin{singlespace}
\begin{center}
  \parindent=0pt
  \vspace*{-0.25in}
\begin{doublespace}
{\uppercase\expandafter{\@thesistitle}}\ \ [20pt]
by \ \ [20pt]
{\uppercase\expandafter{\@author}}\ \ [20pt]
\end{doublespace}
A DISSERTATION \ \ [18pt]
Presented to the Graduate Faculty of the\ \ [18pt]
MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY\ \ [18pt]
In Partial Fulfillment of the Requirements for the Degree\ \ [24pt]
\uppercase\expandafter{\@GraduateDegree}\ \ [18pt]
~in~\ \ [18pt]\%
\uppercase\expandafter{\@department} \ \ [18pt]
\@graddate\ \ [18pt]
Approved by:\ \
\vspace*{0.3in}
\end{center}
\begin{center}
\begin{minipage}{5in}
  \begin{center}\begin{onehalfspacing}
    \@advisor\\
    \@committee\\
  \end{onehalfspacing}\end{center}
\end{minipage}
\end{center}
\end{singlespace}
\vspace*{\fill}
\newpage
\pagestyle{myheadings}

```

```

\pagenumbering{roman}
\setcounter{page}{2}

\fi
}

```

2.6.2 Front Matter Environments

Originally, when the toc was set in double space, the vspace added prior to the SECTION toc entry was 2ex. With the change to having the toc set in single space, such that the two-line entries appear as single spaced, this vertical space needed to be increased.

2014/01/23 - the offset of the SECTION entry in the toc was requested by the OGS to be zero. The command was therefore changed from having a forced \hspace*{-2mm} preceding the word SECTION. In addition, upon request of OGS the \bf command was removed preceding SECTION.

```

\newcommand{\ThesisDissertationType}{thesis}

\newcommand{\ThesisCopyrightPage}[1]{%
  \ifthenelse{\equal{#1}{true}}{%
    {\copyrightpage}%
    {\thispagestyle{empty}\vspace*{1in}\vfill\eject}%
  }

\newenvironment{ThesisPublicationOption}[1]{%
  \ifthenelse{\equal{#1}{ms}}{%
    {\chapter*{Publication Thesis Option}%
      \addcontentsline{toc}{chapter}{PUBLICATION THESIS OPTION}}%
    {\chapter*{Publication Dissertation Option}%
      \addcontentsline{toc}{chapter}{PUBLICATION DISSERTATION
        OPTION}%
      \renewcommand{\ThesisDissertationType}{dissertation}}%
  }{}

\newenvironment{ThesisAbstract}{%
  \chapter*{ABSTRACT}%
  \addcontentsline{toc}{chapter}{ABSTRACT}%
  }{}

\newenvironment{ThesisAcknowledgment}{%
  \chapter*{ACKNOWLEDGMENTS}%
  \addcontentsline{toc}{chapter}{ACKNOWLEDGMENTS}%
  }{}

\newenvironment{ThesisFrontMatter}{}{%
  \addtocontents{toc}{\protect\vspace{4ex}}%
  \addtocontents{toc}{\hbox to \textwidth{{SECTION\ \hfill}}}%
}

```

2.6.3 Copyright Page

```
\def\copyrightpage{
  \hbox{ }
  \thispagestyle{empty}
  \vfill
  \begin{center}
%   \copyright\
    Copyright \@copyrightyear \\\
%   by \\\
    \@author \\\
    All Rights Reserved \\\ [12pt]
  \end{center}
  \clearpage}
```

2.6.4 Table of Contents

The redefinition of tableofcontents is from myuiuc.sty, generated for my own PhD thesis. The code adds column headings to table of contents and lists of tables and figures.

The code defines a command which adds a Chapter entry to the table of contents without a dotted leader or page number. This entry follows the table of contents entries for list of tables, figures and symbols.

A dotted leader is added to table of contents chapter entries.

The vspace prior to the toc entry had previously been 2ex but when the change was made to have the individual contentsline entries be single space, this leading space needed to be increased.

2014/08/13,koh. The section heading is forced to be uppercase. Note that this presumes the loading of the tocloft and etoolbox packages. The dot separation is forced to be uniform.

2021/02/18,koh. The toc, lot and loi suddenly began to be entirely single-spaced after having been double-spaced with single-spaced individual entries. Commenting the lines containing the singlesspacing command in each of the toc, lof/loi and lot commands forced everything to double spacing. However, now any long heading is also double-spaced. Found the afterpnum renewcommand on stack exchange.

```
\patchcmd{\l@section}{#1}{\MakeUppercase{#1}}{}{}

\renewcommand{\cftdotsep}{1}
\newlength{\msttocindent}
\setlength{\msttocindent}{0.5in}
\addtolength{\cftchapindent}{\msttocindent}
\renewcommand{\cftchapaftersnum}{.}
\renewcommand{\cftsecaftersnum}{.}
\renewcommand{\cftsubsecaftersnum}{.}
\renewcommand{\cftsubsubsecaftersnum}{.}
```

```

\renewcommand{\cftfigaftersnum}{.}
\renewcommand{\cfttabaftersnum}{.}

%% ... added (2021/02/18,koh) - begin ...

\renewcommand{\cftchapafterpnum}{\vskip10pt}
\renewcommand{\cftsecafterpnum}{\vskip10pt}
\renewcommand{\cftsubsecafterpnum}{\vskip10pt}
\renewcommand{\cftsubsubsecafterpnum}{\vskip10pt}
\renewcommand{\cftfigafterpnum}{\vskip10pt}
\renewcommand{\cfttabafterpnum}{\vskip10pt}

%% ... end (2021/02/18,koh) ...

\cftsetrmarg{0.5in}

\newcommand{\Thesistocentry}[1]{%
\addtocontents{toc}{\protect\vspace{4ex}}
\addtocontents{toc}%
{\hbox to \textwidth{{} \hspace*{-2mm}{{#1} \ \hfill}}}}
}

\renewcommand{\tableofcontents}{%
\renewcommand{\contentsname}{TABLE OF CONTENTS}
\if@twocolumn
\@restonecoltrue\onecolumn
\else
\@restonecolfalse
\fi
\chapter*{\contentsname
\@mkboth{\uppercase{\contentsname}}{\uppercase{\contentsname}}}
\vspace*{-0.375in}
\hbox to \textwidth{{} \hspace*{-2mm}{{\hfill Page}}
\inglespacing\setlength{\parskip}{10\p@}
\@starttoc{toc}%
\if@restonecol\twocolumn\fi
\setlength{\parskip}{0pt}\doublespacing% ... added by koh ...
}

```

2.6.5 List of Figures, Tables and Symbols

2014/08/12: Per OGS request, the List of Symbols is referred to as Nomenclature.

```

\setlength{\cftfigindent}{0pt}
\setlength{\cfttabindent}{0pt}

\renewcommand{\listoffigures}{%
\newpage%

```

```

\if@twocolumn
  \@restonecoltrue\onecolumn
\else
  \@restonecolfalse
\fi
\addcontentsline{toc}{chapter}{LIST OF ILLUSTRATIONS}
\renewcommand{\listfigurename}{LIST OF ILLUSTRATIONS}
\chapter*{\listfigurename
  \@mkboth{\uppercase{\listfigurename}}{\uppercase{\listfigurename}}}%
  \vspace*{-0.375in}
\hbox to \textwidth{\hspace*{-2mm}{Figure \ \hfill Page}}
\singlespacing\setlength{\parskip}{10\p@}
\starttoc{lof}%
\if@restonecol\twocolumn\fi
\setlength{\parskip}{0pt}\doublespacing% ... added by koh ...
}

\renewcommand{\listoftables}{%
  \newpage%
  \if@twocolumn
    \@restonecoltrue\onecolumn
  \else
    \@restonecolfalse
  \fi
  \addcontentsline{toc}{chapter}{LIST OF TABLES}
  \renewcommand{\listtablename}{LIST OF TABLES}
  \chapter*{\listtablename
    \@mkboth{\uppercase{\listtablename}}{\uppercase{\listtablename}}}%
    \vspace*{-0.375in}
\hbox to \textwidth{\hspace*{-2mm}{Table \ \hfill Page}}
\singlespacing\setlength{\parskip}{10\p@}
\starttoc{lot}%
\if@restonecol\twocolumn\fi
\setlength{\parskip}{0pt}\doublespacing% ... added by koh ...
}

\newcommand{\listofsymbols}[1]{%
  \ifthenelse{\equal{#1}{true}}{%
    % ... then definition if true ...
    \newpage%
    \addcontentsline{toc}{chapter}{NOMENCLATURE}%
    \renewcommand{\nomname}{NOMENCLATURE}%
    \singlespacing
    \printnomenclature%
  }{% ... else definition if false ...
  }
}

```

2.6.6 Thesis Body and Publications

In the `ThesisBody` definition, the `begdef` commands start the thesis body on a new page, reset the page number to arabic and force a 4-line separation between the bottom of a float and the subsequent text (added fall 2011).

The template put together for the first time in Spring 2004 used the `setcounter` command in the base tex file to specify the pagination of the individual starting pages of the publications. This appears not to work. Apparently, these must be edited after adding the `nofiles` command.

```
\newenvironment{ThesisBody}{%
  \newpage%
  \pagenumbering{arabic}%
  \setcounter{page}{1}
  \addtolength{\textfloatsep}{+0.28125in}%
}{}
```

The `ThesisPublications` environment was modified in 2012 to include the suggestion by Ben Payne. For his thesis, which used the `Publication Thesis` option, the OGS requested that the word `SECTION` appear in the toc prior to any chapters which followed the `Publication` chapters. This requirement was originally introduced by Ben as a separate environment. However, since the presence of this in the toc is exclusive to the `publication thesis` option, I added it as part of the trailing commands for the `ThesisPublications` environment and removed the new environment he had added to accomplish the same objective.

(koh, 2014/04/22). The word `PAPERS` was changed to singular and bold-facing removed. Also, changed `SECTION` to normal font.

(koh, 2017/02/07). Added commands to change the numbering format of section, figure, table and equation in the block of thesis publications.

```
\newenvironment{ThesisPublications}%
{
  \Thesistocentry{PAPER}%
  \renewcommand*{\thesection}{\arabic{section}}
  \renewcommand{\thefigure}{\arabic{figure}}
  \renewcommand{\thetable}{\arabic{table}}
  \renewcommand{\theequation}{\arabic{equation}}
% ... original content from thesis body 2018/10/14, koh ...
\titledformat{\section}{\singleline\center\normalsize\bfseries\uppercase}%
  {\thesection.}{.5em}{\doubleline}
\titledformat{\subsection}{\singleline\normalsize\bfseries}%
  {\thesubsection.}{0.5em}{\doubleline}
\titlespacing{\subsection}{0pt}{3.5ex plus 1ex minus .2ex}{1.5ex plus .2ex}
\titledformat{\subsubsection}[runin]{\normalsize\bfseries}%
  {\thesubsubsection.}{0.5em}{\hspace{0.5em}}
\titlespacing{\subsubsection}{\parindent}{\parskip}{0pt}
\titledformat{\paragraph}[runin]{\normalsize\bfseries}%
  {\theparagraph.}{0.5em}{\hspace{0.5em}}
\titlespacing{\paragraph}{\parindent}{\parskip}{0pt}
}%
}
```

```

{\newpage\addtocontents{toc}{\protect\vspace{4ex}}%
\addtocontents{toc}{\hbox to \textwidth{\hspace*{-2mm}%
{SECTION\ \hfill}}}}
% ... reset sectioning to that of thesis body, 2018/10/14, koh ...
\titleformat{\section}{\singlespacing\normalsize\bfseries\uppercase}%
{\thesection.}{.5em}{\doublespacing}
\titlespacing{\section}{0pt}{3.5ex plus 1ex minus .2ex}{1.5ex plus .2ex}
\titleformat{\subsection}[runin]{\normalsize\bfseries}%
{\thesubsection.}{0.5em}{\hspace{0.5em}~}
\titlespacing{\subsection}{\parindent}{\parskip}{0pt}
\titleformat{\subsubsection}[runin]{\normalsize\bfseries}%
{\thesubsubsection.}{0.5em}{\hspace{0.5em}~}
\titlespacing{\subsubsection}{\parindent}{\parskip}{0pt}
\titleformat{\paragraph}[runin]{\normalsize\itshape}%
{\theparagraph.}{0.5em}{\hspace{0.5em}~}
\titlespacing{\paragraph}{\parindent}{\parskip}{0pt}
}

\newenvironment{ThesisOnlyChapters}[2]{%
\setboolean{lofHeading}{#1}%
\setboolean{lotHeading}{#2}%
\ifthenelse{\boolean{lofHeading}}{%
\ThesisListofEntry{lof}{SECTION}%
\addtocontents{lof}{\protect\addvspace{10\p@}}% (2021/02/20,koh)
}%{}%
\ifthenelse{\boolean{lotHeading}}{%
\ThesisListofEntry{lot}{SECTION}%
\addtocontents{lot}{\protect\addvspace{10\p@}}% (2021/02/20,koh)
}%{}%
\setboolean{firstThesisOnlyChapter}{true}}{}

\newcommand{\ThesisListofEntry}[2]{%
\addtocontents{#1}{\protect\vspace{2ex}}
\addtocontents{#1}%
{\hbox to \textwidth{\hspace*{-2mm}{#2} \ \hfill}}}
}

```

Thank you to Ben Payne for the following addition: as of 2012 Feb 22, Sharon Matson at OGS says that the appearance of the word PAPER must appear at the top of the first manuscript, but not subsequent manuscript paper chapters.

A second thank you to Ben Payne is for the following addition. He had a table only in his paper 6 so he wrapped the List of Tables entry in an ifthenelse command, so that only when the paper number was 6 did the Paper # entry get written to the lot file. The code he used for this was the following:

```

\ifthenelse{\equal{#1}{6}}
{\ThesisListofEntry{lot}{PAPER #1}}{}

```

2014/04/22,koh - changed the toc addcontentsline to be consistent with that

of a regular chapter so that it appears exactly as all other chapters, including the appendices.

2017/02/07,koh - added the setcounter commands to make force each manuscript (publication) chapter to restart the numbering from one.

```
\newcommand{\PaperManuscript}[4]{%
  \setboolean{lofHeading}{#2}%
  \setboolean{lotHeading}{#3}%
  \ifthenelse{\equal{#1}{I}}
  %% ... then_txt ...
    {\chapter*{PAPER \ \ \ \ \ \ \ \ \ \ #1. #4}}
  %% ... else_txt ...
    {\chapter*{#1. #4}}%
  \addcontentsline{toc}{chapter}{\protect\numberline{#1.}#4}%
  \addtocontents{toc}{\protect\addvspace{10\p@}}% (2021/02/20,koh)
  %% ... lof Paper heading ...
  \ifthenelse{\boolean{lofHeading}}{%
    \ThesisListofEntry{lof}{PAPER #1}%
    \addtocontents{lof}{\protect\addvspace{10\p@}}% (2021/02/20,koh)
  }{}%
  %% ... lot Paper heading ...
  \ifthenelse{\boolean{lotHeading}}{%
    \ThesisListofEntry{lot}{PAPER #1}%
    \addtocontents{lot}{\protect\addvspace{10\p@}}% (2021/02/20,koh)
  }{}%
  %% ... reset counter values ...
  \setcounter{section}{0}
  \setcounter{figure}{0}
  \setcounter{table}{0}
  \setcounter{equation}{0}
}
```

2017/01/24, koh - added commands which allow for a generic manuscript chapter, with formatting essentially identical to the rest of the thesis. 2018/10/14, koh - added center command to make the abstract formatting match that of a first-level (OGS) heading.

```
\newcommand{\ThesisPaperAuthor}[1]{%
  \begin{center}\singlespacing#1\end{center}}
\newcommand{\ThesisPaperKeywords}[1]{\noindent\textbf{Keywords:} #1}
\newcommand{\ThesisPaperReferences}[1]{\bibliography{#1}}
\newenvironment{ThesisPaperAbstract}%
  {\vspace*{0.25in}\begin{center}\textbf{ABSTRACT}\end{center} \%\\
  \addcontentsline{toc}{section}{ABSTRACT}
  \hspace{\parindent}}%
  {}
```

Two commands, which parallel the `\PaperManuscript` commands, are introduced for the thesis body chapters and the appendix chapters, respectively. At present, these commands merely pass the name of the chapter to the chapter command, however, it allows for the possibility of additional tasks preceding the

typesetting of a specific chapter, such as additional entries to the list of files. Note that these intentionally do not input a tex file. This is left as a separate command so that the user has the flexibility of including this command either in the root tex file, such as in the companion template, or in the input file for a chapter.

```

% \titleformat{\chapter}{\singlespacing\center\normalsize
% \bfseries\uppercase}{SECTION \thechapter.}{.5em}{\doublespacing}
% \titlespacing{\chapter}{0pt}{-0.5in}{0.6875in}
% \chapter{#1}}%

\newcommand{\ThesisBodyChapter}[1]{%
\ifthenelse{\boolean{firstThesisOnlyChapter}}{%
{\titleformat{\chapter}[display]
{\singlespacing\center\normalsize\bfseries}
{\MakeUppercase{SECTION}}
{3\baselineskip} % ... desired spacing (2021/03/12,koh)
{\normalsize\thechapter. }
\titleformat{name=\chapter,numberless}[display]
{\singlespacing\center\normalsize\bfseries\uppercase}
{}
{0pt}
{\normalsize}
\chapter{\MakeUppercase{#1}}}%
{\chapter{#1}}% ... end of ifthenelse block ...
\setboolean{firstThesisOnlyChapter}{false}
\titleformat{\chapter}{\singlespacing\center\normalsize\bfseries\uppercase}%
{\thechapter.}{.5em}{\doublespacing}
\titlespacing{\chapter}{0pt}{-0.4375in}{0.4375in}
}

\newcommand{\ThesisAppendixChapter}[1]{\chapter{#1}}

```

2.6.7 Redefined Chapter commands

The first command definition is pulled directly from the report class. The only changes are to comment out the addvspace commands for the lof and lot. This was flagged by Missouri S&T thesis checkers as not acceptable in Fall 2011. Commenting out these two commands took care of the issue. This command with the specification of parskip in the listoffigures and listoftables commands gives S&T desired spacing.

Added an `ifthenelse` statement to the command so that that `pagestyle` is changed to empty if the page counter has the value of one. This has the effect of removing the page number on the first page of the thesis body.

```

\def\@chapter[#1]#2{\ifnum \c@secnumdepth >\m@ne
\refstepcounter{chapter}%
\typeout{\@chapapp\space\thechapter.}%

```

```

\addcontentsline{toc}{chapter}%
{\protect\numberline{\thechapter.}#1}%
\addtocontents{toc}{\protect\addvspace{10\p@}}% (2021/02/20,koh)
\else
\addcontentsline{toc}{chapter}{#1}%
\addtocontents{toc}{\protect\addvspace{10\p@}}% (2021/02/20,koh)
\fi
\chaptermark{#1}%
\ifthenelse{\value{page}=1}{\thispagestyle{empty}}{}
%\addtocontents{lof}{\protect\addvspace{10\p@}}%
%\addtocontents{lot}{\protect\addvspace{10\p@}}%
\if@twocolumn
\@topnewpage[\@makechapterhead{#2}]%
\else
\@makechapterhead{#2}%
\@afterheading
\fi}

\renewcommand*{\l@chapter}[2]{%
\ifnum \c@tocdepth > \m@ne
\addpenalty{-\@highpenalty}%
\vskip 1.0em \@plus\p@
\setlength\@tempdima{1.5em}%
\begingroup
% ... original version used \@pnumwidth instead of @tocrmarg ...
% tocloft package resets @tocrmarg with \cftsetrmarg command
% (koh, 2017/10/04) ...
% \parindent \z@ \rightskip \@pnumwidth
% \parfillskip -\@pnumwidth
\parindent \z@ \rightskip \@tocrmarg
\parfillskip -\@tocrmarg
\leavevmode %\bfseries
\advance\leftskip\@tempdima
\hskip -\leftskip
\uppercase{#1}\nobreak \dotfill \nobreak\hbox to\@pnumwidth{\hss #2}\par
\penalty\@highpenalty
\endgroup
\fi}

```

2.6.8 Appendix environment

The appendix environment took some effort to create as it has a number of unique aspects for Missori S&T. The key difference is that if there is one appendix, it should appear without a letter in the toc and on the top of the page as a typical chapter heading. However, if there are more than one appendices, it should appear on its own page but only the “chapter” level appendix headings should appear in the toc. *Very important:* the closing tocdepth setting is very important because if it is set to zero when leaving the environment, the list of

tables and list of illustrations will have no entries. Apparently, a tocdepth of more than zero is necessary for any list of illustrations or list of tables entries to be included.

The titleformat command for the multiple appendix case has now been modified to center the text on the page both vertically and horizontally. A hearty thanks to Phil Thiem for figuring this one out.

koh, 2014/04/22: changed APPENDICES to normal font.

koh, 2018/08/06: for the multiple chapter appendix, the appendix chapter designation (A, B, etc.) is to be included with the section numbering, however, that is not the case with the single chapter appendix. This was difficult to solve as “thesection” counter was inheriting the chapter number. For reasons I do not understand, one could not just access the section number by use of arabicsection. Finally was able to determine that a redefinition of 2to include only the section number did the trick. RESOLVED.

koh, 2018/10/14: for the multiple chapter appendix, OGS has made the decision to drop the chapter designation (A, B, etc) to mirror the approach used in the thesis publication chapters.

```
\newenvironment{ThesisAppendix}[3]{%
  \newpage%
  \captionsetup{list=no}
  \renewcommand{\thefigure}{\arabic{figure}}
  \renewcommand{\thetable}{\arabic{table}}
  \renewcommand{\theequation}{\arabic{equation}}
  \setboolean{lofHeading}{#2}
  \setboolean{lotHeading}{#3}
  \ifthenelse{\boolean{lofHeading}}{\ThesisListofEntry{lof}{APPENDIX}}{}%
  \ifthenelse{\boolean{lotHeading}}{\ThesisListofEntry{lot}{APPENDIX}}{}%
  \ifthenelse{equal{#1}{one}}{}%
% ... single chapter appendix ...
  {\setcounter{secnumdepth}{3}%
   \addcontentsline{toc}{chapter}{\MakeUppercase{Appendix}}%
   \addtocontents{toc}{\protect\setcounter{tocdepth}{-1}}%
   \titleformat{chapter}{\center\normalsize\bfseries\uppercase}%
     {\{.5em\}{APPENDIX \ \ \vspace*{0.125in}\ \ \center}%
   \titlespacing{chapter}{0pt}{-0.59375in}{0.4375in}%
   \renewcommand{\thesection}{\arabic{section}}%
   \titleformat{section}{\normalsize\bfseries\uppercase}%
     {\thesection.}{.5em}{}%
   \titleformat{subsection}[runin]{\normalsize\bfseries}%
     {\thesection.\arabic{subsection}.}{0.5em}%
     {\[. \hspace{0.5em}~]}%
   \titlespacing{subsection}{0pt}{3.5ex plus 1ex minus .2ex}{1.5ex plus .2ex}%
   \titleformat{subsubsection}[runin]%
     {\normalsize\bfseries}%
     {\thesection.\arabic{subsection}.\arabic{subsubsection}.}%
     {0.5em}{\[. \hspace{0.5em}~]}%
% ... multiple chapter appendix ...
```

```

{\addtocontents{toc}{\protect\setcounter{tocdepth}{0}}%
\titleformat{\chapter}%[block]%
{\vspace*{\stretch{1}}\center\normalsize\bfseries\uppercase}%
{APPENDIX \thechapter.}{0em}%
% {\|\~\|nopagenumber}[\vspace*{\stretch{1}}\newpage]
% {\|\ \nopagenumber}[\vspace*{\stretch{1}}\newpage] %(2021/03/25,koh)
% {\|\~\|hspace{-1in}\nopagenumber}[\vspace*{\stretch{1}}\newpage]
%\titlespacing{\chapter}{0pt}{-0.5in}{0.6875in}
\setcounter{secnumdepth}{4}% ... 4 = number paragraph headings ...
\renewcommand{\thesection}{\arabic{section}}%
\titleformat{\section}%
{\singlespacing\center\normalsize\bfseries\uppercase}%
{\thesection.}{.5em}{\}[doublespacing]%
\titleformat{\subsection}%
{\singlespacing\normalsize\bfseries\uppercase}%
{\thesubsection.}{0.5em}{\}[doublespacing]%
% \titlespacing{\subsection}{0pt}{\parskip}{0pt}
\titlespacing{\subsection}{0pt}{3.5ex plus 1ex minus .2ex}{1.5ex plus .2ex}
\titleformat{\subsubsection}[runin]{\normalsize\bfseries}%
{\thesubsubsection.}{0.5em}{\}[. \hspace{0.5em}~]%
\titlespacing{\subsubsection}{\parindent}{\parskip}{0pt}
\titleformat{\paragraph}[runin]{\normalsize\bfseries}%
{\theparagraph.}{0.5em}{\}[. \hspace{0.5em}~]
\titlespacing{\paragraph}{\parindent}{\parskip}{0pt}
\Thesiscentry{APPENDICES}
\appendix}%
}%
{\addtocontents{toc}{\protect\setcounter{tocdepth}{4}}%
}

```

2.6.9 Bibliography environment and style

The default bibliography environment was pulled from the base report.cls file and edited to specify the chapter name and the spacing appropriate to the thesis class.

Specify the appropriate bst package. Not presently used (2008/01/22).

(2021/03/25, koh) For some reason unbeknownst to me, the spacing after the bibname in the ThesisPaperBibliography has a smaller white space following it. For the ThesisBibliography, the spacing does seem to follow the chapter spacing. To fix, I added an explicit after spacing, tweaked to give the correct output, for the ThesisPaperBibliography environment.

```

\newenvironment{ThesisBibliography}[1]{%
\renewcommand{\bibname}{REFERENCES}
%\chapter*{#1} % ... added by koh ...
\clearpage\addcontentsline{toc}{chapter}{#1}%
}{%
}

```

```

\newenvironment{ThesisPaperBibliography}[1]{%
  \renewcommand{\bibname}{REFERENCES}
  \titlespacing{\section}{0pt}{3.5ex plus 1ex minus .2ex}{3.5ex plus .2ex}
  %\section*{#1} % ... added by koh ...
  \addcontentsline{toc}{section}{#1}%
}{}

\renewenvironment{thebibliography}[1]
{
  \@mkboth{\MakeUppercase\bibname}{\MakeUppercase\bibname}%
  \singlespacing\setlength{\parskip}{2pt} % ... added by koh ...
  \list{\@biblabel{\@arabic\c@enumiv}}%
    {\settowidth\labelwidth{\@biblabel{#1}}%
     \leftmargin\labelwidth
     \advance\leftmargin\labelsep
     \@openbib@code
     \usecounter{enumiv}%
     \let\p@enumiv\@empty
     \renewcommand\theenumiv{\@arabic\c@enumiv}}%
  \sloppy
  \clubpenalty4000
  \@clubpenalty \clubpenalty
  \widowpenalty4000%
  \sfcode'\.\@m}
{\def\@noitemerr
  {\@latex@warning{Empty 'thebibliography' environment}}}%
\endlist
\doublespacing % ... added by koh, 2011/10/20 ...
}

%\bibliographystyle{ijhvacr}

```

2.6.10 Back Matter: Vita

```

\newenvironment{Vita}{%
  \chapter*{Vita}%
  \addcontentsline{toc}{chapter}{VITA}}{}

```

2.6.11 Page style for the Thesis Body

The page numbers are placed in the upper right hand corner.

```

\renewcommand{\ps@plain}{%
  \renewcommand{\@oddhead}{\hfill\textit{thepage}}%
  \renewcommand{\@evenhead}{\@oddhead}%
  \renewcommand{\@evenfoot}{}%
  \renewcommand{\@oddfoot}{}}

\newcommand{\psplainreset}{\renewcommand{\ps@plain}{%
  \renewcommand{\@oddhead}{\hfill\textit{thepage}}%
  \renewcommand{\@evenhead}{\@oddhead}%

```

```

\renewcommand{\@evenfoot}{}%
\renewcommand{\@oddfoot}{}}
}

```

2.6.12 Dotted leader formatting

```

% ... dot separation for leaders ...
\renewcommand{\dotsep}{4.5}

```

```

</mstogs>

```

3 UIUC Thesis Style File

Ideally, this would be put into a class file like that for the Missouri S& T thesis/dissertation. However, in the interest of time, I am going to include it wholesale so that it can be revised or hacked as need be.

```

(*uiucthesis)
\NeedsTeXFormat{LaTeX2e}[1994/12/01]

% Specify name of contents and reference list

\renewcommand{\contentsname}{Table of Contents}

\renewcommand{\bibname}{REFERENCES}

% Set numbering of preliminary pages and thesis body.

\newenvironment{preliminary}%
{
\newpage\pagenumbering{roman}\setcounter{page}{3}}%
{
\clearpage\pagenumbering{arabic}\setcounter{page}{1}}

% Add column headings to table of contents and lists
% of tables and figures

\renewcommand{\tableofcontents}{%
\if@twocolumn
\@restonecoltrue\onecolumn
\else
\@restonecolfalse
\fi
\chapter*{\contentsname
\@mkboth{\uppercase{\contentsname}}{\uppercase{\contentsname}}}
\hbox to \textwidth{{} \hspace*{-2mm}{\bf \hfill Page}}
\@starttoc{toc}%
\if@restonecol\twocolumn\fi
}

```

```

}

\renewcommand{\listoffigures}{%
  \if@twocolumn
    \@restonecoltrue\onecolumn
  \else
    \@restonecolfalse
  \fi
  \chapter*{\listfigurename
    \@mkboth{\uppercase{\listfigurename}}{\uppercase{\listfigurename}}}%
  \hbox to \textwidth{\{} \hspace*{-2mm}{\bf Figure \ \hfill Page}}
  \@starttoc{lof}%
  \if@restonecol\twocolumn\fi
}

\renewcommand{\listoftables}{%
  \if@twocolumn
    \@restonecoltrue\onecolumn
  \else
    \@restonecolfalse
  \fi
  \chapter*{\listtablename
    \@mkboth{\uppercase{\listtablename}}{\uppercase{\listtablename}}}%
  \hbox to \textwidth{\{} \hspace*{-2mm}{\bf Table \ \hfill Page}}
  \@starttoc{lot}%
  \if@restonecol\twocolumn\fi
}

% Define a command which adds a Chapter entry to the table of contents
% without a dotted leader or page number. This entry follows the table
% of contents entries for list of tables, figures and symbols.

\newcommand{\chaptertocentry}{%
\addtocontents{toc}{\protect\vspace{2ex}}
\addtocontents{toc}%
{\hbox to \textwidth{\{} \hspace*{-2mm}{\bf Chapter \ \hfill}}}}
}

% Add dotted leader to table of contents chapter entries.

\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 \dotfill \nobreak\hbox to\@pnumwidth{\hss #2}\par
\penalty\@highpenalty
\endgroup
\fi}

% Thesis title page from file given to me by T.E. Morthland.

% *****
% * TITLE PAGE *
% *****
%
% Macros to set the degree type
%
%
\def\phdthesis{\def\@GraduateDegree{Doctor of Philosophy}}
\def\msthesis{\def\@GraduateDegree{Master of Science}}
\def\department#1{\def\@dept{#1}}
\def\college#1{\def\@college{#1}}
\def\schools#1{\def\@schools{#1}}
\def\degreeyear#1{\def\@degreeyear{#1}}
%
% set initial values for title page
%
\msthesis
\department{Mechanical and Industrial Engineering}
\college{Graduate College}
\def\@schools{}
\def\@degreeyear{\number\year}
%
% The following \maketitle should make a valid UIUC title page,
% assuming you've set all the fields, e.g.
% \title{MY THESIS}
% \author{JOE X. SCHMOO}
% \schools{B.S., Cow Flop U, 1984 \\\ M.S. Illiness Tech, 1988}
%
\def\maketitle{
\begingroup
\spacespace
%
% setting lineskip to 0pt insures no extra space between following
% vboxes.
%
\lineskip=0pt
\lineskiplimit=\maxdimen
\thispagestyle{empty}
\setcounter{page}{0}

```



```

%
%   this bit of garbage allows us to paste a larger-than-allowed vbox
%   on the first page without getting an over-full vbox. If we don't
%   do this, we get a blank sheet of paper for the first page, followed
%   by our over-full vbox. the \vss at the bottom of this vbox causes
%   us to un-glue 9in of vertical space, making TeX think that this
%   fits on a single page. See pages 82,83 of the TeXbook for why.
%
\vspace*{0.5in}%
\vtop to 0in{%
%\vtop to 0in{\centerline{\uppercase\expandafter{\@title}}\vss}%
\vtop to 0in{\centerline{\begin{tabular}{c}\uppercase\expandafter{\@title}\end{tabular}}\vss}%
%
%   skip to "by" and author line; measurements w.r.t top line (2.25in)
%
\kern 1.75in%
\vtop to 0in{\centerline{BY}%
  \vskip \baselineskip
\centerline{\uppercase\expandafter{\@author}}%
\vskip \baselineskip
\begin{center}\begin{tabular}{c}\@schools\end{tabular}\end{center}%
\vss}\kern -1.75in%
%
%   Skip down from last item (which has baseline at the top) to
%   thesis line.
%
\kern 4.25in%
\vtop to 0in{%
\centerline{THESIS}%
\vskip \baselineskip
\centerline{\strut Submitted in partial fulfillment of the requirements}%
\centerline{\strut for the degree of \@GraduateDegree\ in \@dept}%
\centerline{\strut in the \@college\ of the}%
\centerline{\strut University of Illinois at Urbana-Champaign, \@degreeyear}%
\vss}\kern -4.25in%
%
\kern 6.75in%
\vtop to 0in{\centerline{Urbana, Illinois}\vss}%
\kern -6.75in\vss}
\endgroup}
%
</uiucthesis>

```