

**INFORMATION TECHNOLOGIES  
UNIVERSITY OF DELAWARE**

**L<sup>A</sup>T<sub>E</sub>X UDThesis Style:  
Dissertations and Theses (Master's and Senior)**

**Introduction**

The L<sup>A</sup>T<sub>E</sub>X UDThesis style is a document class and class option designed to provide standard formatting for dissertations and theses (Master's and Senior) according to the regulations specified by the University of Delaware Graduate College's *Thesis and Dissertation Manual* and Undergraduate Research Program's *Senior Thesis Handbook*.

The L<sup>A</sup>T<sub>E</sub>X UDThesis class provides the correct font size, spacing and margins for your document including the proper page numbering (roman vs. arabic) and placement. It provides the correct commands for automatic formatting of the title and approval pages with the correct wording. You will need to make the appropriate changes for the information such as title, author, advisers' and committee members' names and titles. All of the standard features of L<sup>A</sup>T<sub>E</sub>X are available such as automatic generation of Table of Contents, List of Tables, List of Figures, chapters, appendices, sections, equations, tables and figures, and hypertext links for a rich PDF.

Although this document does not require that you know how to use the UDThesis class, it does assume that you are familiar with using L<sup>A</sup>T<sub>E</sub>X.

## Additional resources

- *Thesis and Dissertation Manual*, Step-by-Step Graduation Guide—available for downloading from the [Graduate College Web site](#).
- *Senior Thesis Handbook*, Overview of Program—available for downloading from the [Undergraduate Research Program Web site](#).
- For graduate students, email questions about formatting to the [Graduate College](#).
- For undergraduate students, email questions about formatting to the [Undergraduate Research Program](#).
- If you have specific problems defined by the Graduate College or Undergraduate Research Program related to these styles, submit a [help request](#), send [email](#) or call the Information Technologies Support Center at 302-831-6000.

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## 1 Preparation

Obtain a copy of the L<sup>A</sup>T<sub>E</sub>X UDThesis class and base files appropriate for your degree from the <http://www.udel.edu/udthesis> Web site.

**Note:** Make sure you follow the download instructions properly so that all the files you need to get started will be in the `udthesis-base-files` folder or directory. You should also use this same folder or directory for all the other files you create for your document so L<sup>A</sup>T<sub>E</sub>X will be able to find them. You may want a copy of the `udthesis-base-files` folder or directory before you start making changes so you have an original to reference.

## 2 Document organization

Your document organization is critical for generating the correct page and section numbers for the front matter, body of your document, and back matter.

### **The preliminary (front matter) material of your document:**

- Title and Approval Pages
  - Preface or Acknowledgments
  - Table of Contents
  - List of Tables
  - List of Figures
  - Abstract
- If you have any other sections, such as “Nomenclature” or “Dedication,” you can include them here.

### **The body of your document:**

- Chapters

### **The back matter of your document:**

- References or Bibliography
- Appendices

It is generally most convenient to put all front matter in one file and each chapter, reference or bibliography, and appendix into separate files as well as create a main document to include these files. All files must each have an extension of `.tex`. Each file should be included in the order defined above using `\include` followed by the filename enclosed in `{}` in the main document file. When you include the files in the main document file, use only the filename without the `.tex` extension. Remember: `\include` is used in the main document to retain the correct section and page numbering so that you may format one or several included files using the `\includeonly` command in your preamble.

The first line of your main document file must be

```
\documentclass {udthesis}
```

for a graduate degree (thesis or dissertation) or

```
\documentclass [seniorthesis] {udthesis}
```

for an undergraduate degree (Honors Senior Thesis with Distinction or Senior Thesis with Distinction).

A typical **main document file** would look like this:

```
\documentclass {udthesis}
\begin {document}
\include{filename for front matter}
\include{filename for first chapter}
\include{filename for second chapter}
...
\include{filename for references}
...
\include{filename for first appendix}
\include{filename for second appendix}
\end {document}
```

**Note:** Make sure you download the correct base files for your degree from the <http://www.udel.edu/udthesis> Web site. A main document file is provided specifically for your degree. You will need to change the filenames in the `\include` commands if you want to use different names. Do not use old files as they may not work with this version of the UDThesis document class.

### 3 UDThesis document class

The L<sup>A</sup>T<sub>E</sub>X UDThesis style is based on the standard report style document class with the following modifications and additions.

- The default font size is 12-point, and any font size specified as an option for UDThesis will be ignored.
- The `titlepage` option is not supported.
- The `seniorthesis` option is provided for Honors Senior Thesis with Distinction or Senior Thesis with Distinction documents.
- The `hyperref` package is automatically loaded to provide PDF hyperlinks for the Table of Contents, List of Tables, List of Figures, all cross-referencing for figures, tables, equations and citations for references. It will use the information provided for the `\title` and `\author` in the title and approval pages as the properties defined for the PDF document. Special care must be taken for all sectioning commands when using the `hyperref` package to generate a proper table of contents entry as well as correct PDF bookmarks. See the “Line breaking or special characters in commands” section on page 13 for details.
- Standard L<sup>A</sup>T<sub>E</sub>X list environments have been modified to provide single-spaced items, but double-spaced between items. The environments are `itemize`, `enumerate`, `quote`, `quotation`, `description`, `thebibliography`. Additional list environments specific to UDThesis are `thereferences` and `desc`.
- Standard L<sup>A</sup>T<sub>E</sub>X commands have been modified to provide correct spacing for sectioning commands, `\footnote`, and `\caption`. Additional commands specific to UDThesis are `\oneappendix`, `\prefacesection`, `\prefacesectiontoc`, and `\captioncont`.
- Additional commands specific to UDThesis are available for the title and approval pages and front matter.

### 4 Title and Approval pages (front matter)

UDThesis provides additional commands specific to your degree to make the formatting of title, approval pages, and front matter easy. Generally, there is some standard text associated with each command which appears only if you include the command. The order in which you place the commands is very important to get the correct page numbering (i.e., no page numbers on title pages and roman numbers for front matter).

**Note:** Make sure you download the correct base files for your degree from the <http://www.udel.edu/udthesis> Web site. A title and approval page (tap) document file which contains all front matter is provided specifically for your degree. You will need to change the default text provided for the commands to the appropriate information for your document such as title, author, etc. Do not use old files as they may not work with this version of the UDThesis document class.

## Dissertation

### Title Page:

```
\title[First Line of Title Second Line of Title]{First Line of Title\\
Second Line of Title}
\author{Author}
\type{dissertation}
\degree{Doctor of Philosophy}
\majorfieldtrue\majorfield{Major}
\degreedate{Semester Year}
% Optional PDF properties
\keywords{Keyword,Keyword,Keyword}
\subject{Subject}

\maketitlepage % Generates Title Page
```

### Approval and Signature Pages:

```
\begin{approvalpage}
\chair{Xxxx Xxxx, Highest Degree}{Chair of the Department of Xxxx}
\dean{Xxxx Xxxx, Highest Degree}{Dean of the College of Xxxx}
\end{approvalpage}

\begin{signedpage} % Up to 4 signatures
\profmember{Xxxx Xxxx, Highest Degree}
\member{Xxxx Xxxx, Highest Degree}
\member{Xxxx Xxxx, Highest Degree}
\member{Xxxx Xxxx, Highest Degree}
\end{signedpage}

% For additional signatures beyond 4, uncomment and use
% \begin{signedpagecont}
% \member{Xxxx Xxxx, Highest Degree}
% \member{Xxxx Xxxx, Highest Degree}
% \end{signedpagecont}
```



## Master's Thesis

### Title Page:

```
\title[First Line of Title Second Line of Title]{First Line of Title\\
Second Line of Title}
\author{Author}
\type{thesis}
\degree{Master of Science}
\majorfieldtrue\majorfield{Major}
\degreedate{Semester Year}
% Optional PDF properties
\keywords{Keyword,Keyword,Keyword}
\subject{Subject}

\maketitlepage % Generates Title Page
```

### Approval Page:

```
\begin{approvalpage}
\chair{Xxxx Xxxx, Highest Degree}{Chair of the Department of Xxxx}
\dean{Xxxx Xxxx, Highest Degree}{Dean of the College of Xxxx}
\dean{Xxxx Xxxx, Highest Degree}{Dean of the College of Xxxx}
\end{approvalpage}
```

## Senior Thesis

### Title Page:

```
\title[First Line of Title Second Line of Title]{First Line of Title\\
Second Line of Title}
\author{Author}
% Bachelor of Arts, Bachelor of Science or Bachelor of [majorfield] Engineering
% (i.e. Bachelor of Electrical Engineering)
\degree{Bachelor of Science}
% Required to specify majorfield for Bachelor of Arts or Science
% Comment out if Engineering
\majorfieldtrue\majorfield{Major}
\degreedate{Semester Year}
% Optional PDF properties
\keywords{Keyword,Keyword,Keyword}
\subject{Subject}

% All senior theses are with distinction.
% By default honors is set to false (i.e. \honorsfalse)
% Uncomment if you are doing an Honors Senior Thesis
%\honorstrue

\maketitlepage % Generates Title Page
```

## Approval Page:

```
\begin{approvalpage}
\profmember{Xxxx Xxxx, Highest Degree}
\member{Xxxx Xxxx, Highest Degree}{Department of Xxxx}
\ucosafhmember{Xxxx Xxxx, Highest Degree}
\chair{Donald Sparks, Ph.D.}
\end{approvalpage}
```

## Front matter for all degrees

```
\begin{front} % Starts front material (Roman style page numbers)

\prefacesection{Acknowledgements}
%\input{acknowl} % This file (acknowl.tex) contains the text
% for the acknowledgments or type text here.

% Table of Contents is always created, but you
% may set \tablespagefalse and \figurespagefalse
% if you don't want these generated automatically
% (i.e. List of Tables and List of Figures).
% These are set to true by default (i.e. \tablespagetrue,
% \figurespagetrue).

% Uncomment if you do not want a List of Figures.
%\figurespagefalse

% Uncomment if you do not want a List of Tables.
%\tablespagefalse

\maketocloflot

\prefacesectiontoc{Abstract}
%\input{abstract} % This file (abstract.tex) contains the text
% for an abstract or type text here.

\end{front}
```

## 5 Sectioning commands

There are two forms for all sectioning commands, either

```
\section_command[title for TOC entry]{title in body of document}
```

or

```
\section_command*{title in body of document}
```

where *section\_command* can be one of the sectioning commands listed in table 1 on page 12.

The first form will produce automatic, sequential numbering for each sectioning command as well as a Table of Contents entry based on the *title in body of document*. If the option *title for TOC entry* is not used, then the information provided in the *title in body of document* will be used for the Table of Contents entry. The second or \* form (unnumbered) will not produce a number for any *section\_command* and no entry will be made in the Table of Contents.

## 6 Special Table of Contents entries

### 6.1 Unnumbered sectioning commands

If you need to produce a Table of Contents entry for an unnumbered sectioning command, use the command

```
\addcontentsline{toc}{section_command}{title for TOC entry}
```

where *section\_command* is usually the same as the name of the sectioning command used in the \* form without the \, and the *title in body of document* should also be used for the *title for TOC entry*. This command should immediately follow the \* form sectioning command. Remember that you only need to do this if you use the \* form (unnumbered) since the other form will automatically produce an entry in the Table of Contents.

**Table 1:** UDThesis sectioning commands

Section command	What it does
<code>\chapter</code>	automatically numbers chapters; you supply chapter title e.g., <code>\chapter{Introduction}</code>
<code>\chapter*</code>	same as <code>\chapter</code> , but unnumbered and no Table of Contents entry
<code>\appendix</code>	same as <code>\chapter</code> , but for appendices e.g., <code>\appendix{Computer Programs}</code>
<code>\oneappendix</code>	same as <code>\appendix</code> , but used where there is only one appendix
<code>\prefacesection</code>	same as <code>\chapter*</code> , but used only in the front matter and no Table of Contents entry e.g., <code>\prefacesection{Acknowledgments}</code>
<code>\prefacesectiontoc</code>	same as <code>\prefacesection</code> , but there is a Table of Contents entry e.g., <code>\prefacesectiontoc{Abstract}</code>
<code>\section</code>	numbered within Chapter or Appendix e.g., <code>\section{Melt Down}</code>
<code>\section*</code>	same as <code>\section</code> , but unnumbered and no Table of Contents entry
<code>\subsection</code>	numbered within Section e.g., <code>\subsection{The First Minute After}</code>
<code>\subsection*</code>	same as <code>\subsection</code> , but unnumbered and no Table of Contents entry
<code>\subsubsection</code>	numbered within SubSection e.g., <code>\subsubsection{The First Day After}</code>
<code>\subsubsection*</code>	same as <code>\subsubsection</code> , but unnumbered and no Table of Contents entry
<code>\paragraph</code>	numbered within SubSubSection e.g., <code>\paragraph{The First Week After}</code>
<code>\paragraph*</code>	same as <code>\paragraph</code> , but unnumbered and no Table of Contents entry
<code>\subparagraph</code>	numbered within Paragraph e.g., <code>\subparagraph{The First Month After}</code> but no Table of Contents entry

The example below will produce an unnumbered section and a Table of Contents entry.

---

```
\section*{All Figures Representing X,Y,Z Data}
\addcontentsline{toc}{section}{All Figures Representing X,Y,Z Data}
```

---

## 6.2 Forcing a page break

Sometimes you may find that an entry in the Table of Contents is split across pages or the default page break is not ideal. To force a page break in the table of contents, use the command

```
\addtocontents{toc}{\protect\newpage}
```

immediately before the sectioning command in your document where you want the page break to occur in the table of contents. It is highly recommended that you do not specify any page breaks in the table of contents until your document is completed.

## 6.3 Forcing a blank line

When adding entries to the Table of Contents manually, you may find it necessary to also add a blank line. To force a blank line in the table of contents, use the command

```
\addtocontents{toc}{\protect\vspace{\baselineskip}}
```

immediately before the command where you want the blank line to occur in the table of contents. Remember that spacing is automatic in the Table of Contents, so it is highly recommended that you do not specify any blank lines until your document is completed.

## 7 Line breaking or special characters in commands

Special care must be taken with the `\title` command, sectioning commands and the `\caption` command if you need to control line breaks or special characters.

## 7.1 Title command

The `\title` command has been modified to provide an option for the PDF document property for `hyperref`, like the sectioning commands provide an option for the table of contents and the caption command provides an option for the list of tables or figures.

The complete form for the `\title` command is

```
\title[title for PDF document property]{title in body of document}
```

If you do not use the option *title for PDF document property*, then the information provided in the *title in body of document* will be used for the PDF document property.

Most special characters, such as mathematical symbols, are ignored and displayed verbatim if the *title for PDF document property* option is not used. However, if you need to break the lines of your title, then you must supply the *title for PDF document property* option; otherwise, `\\` will cause an error.

Here is an example of line breaking in your title command.

---

```
\title[Line one of the title: Line two of the title]
{Line one of the title:\\
Line two of the title}
```

---

Here is an example of special characters in your title command where you want the word “water” to be used for the PDF document property rather than “H<sub>2</sub>O”.

---

```
\title[Using water to generate renewable energy]
{Using H$_2$O to generate renewable energy}
```

---

## 7.2 Sectioning commands

Sometimes the title for a chapter or appendix is very long and you need to control the line breaks so it centers nicely in the body of the document but leaves the entry in

the table of contents as is. To do this, use the sectioning command form:

```
\section_command[title for TOC entry]{title in body of document}
```

The *title for TOC entry* will be your chapter title without any line breaks, and the *title in body of document* should have the `\\` command after the word where you want to break the chapter title into two lines. Here is an example for a chapter:

---

```
\chapter[This is a very long title  
that needs to be on two lines]  
{This is a very long title\\  
that needs to be on two lines}
```

---

If you forget the optional entry for the Table of Contents, it will not cause an error, but the entry will not be properly aligned as a hanging indent.

Another situation may be that your chapter or appendix title in the body of the document is fine, but you need to break the table of contents entry. Since `hyperref` also uses the *title for TOC entry* to build PDF bookmarks, and since the `\\` is ignored, you need to use the `\newline\` command (the space after the last `\` is important) after the word where you want to break the line in the table of contents and also have the PDF bookmark look correct. You will get a `hyperref` warning about the `\newline` command being ignored, but this is normal. Here is an example for an appendix:

---

```
\appendix[This is a very long title\newline\ that needs  
to be on two lines]{This is a very long title  
that needs to be on two lines}
```

---

Of course, you may combine both of these to control the line breaks independently in the table of contents and in the body of the document.

For all other sectioning commands such as `\section`, `\subsection`, etc., it is most likely that you will only need to control the line break in the table of contents entry as shown in the example above for `\appendix`.

Remember the `hyperref` package generates PDF bookmarks for all sectioning commands using the *title for TOC entry* if it was specified or the *title in body of document*. However, most mathematical symbols are ignored and left blank or missing in the PDF bookmark unless you provide an alternative. Below is an example of a warning from the `hyperref` package:

---

```
Package hyperref Warning: Token not allowed in a PDF string
(PDFDocEncoding):(hyperref) removing 'math Pi' on input line 39
```

---

A warning will be generated for each mathematical symbol not allowed in the PDF bookmark. You should not ignore these warnings and instead provide an alternative using

```
\texorpdfstring{used in document}{used in PDF bookmark}
```

in your sectioning command. Here is an example of the mathematical symbol,  $\Pi^*$ , in a `\section` command that will appear in the document (body and Table of Contents entry) and the alternate text, “ $\Pi^*$ ” for the PDF bookmark.

---

```
\section{The \texorpdfstring{\math Pi^*}{Pi*} construction}
```

---

### 7.3 Caption command

The `\caption` command is similar to the sectioning commands `\section`, `\subsection`, etc., where you will most likely only need to control the line break in the list of tables or figures, and the *title in body of figure or table* will be formatted correctly. To accomplish this, you will need to supply the *title in LOT or LOF entry* option using the command `\newline\` after the word in the caption where you want to break the line. For example:

---

```
\caption[This is a caption with two parts.\newline\ (a)
Part One and (b) Part Two.]{This is a caption with two parts.(a)
Part One and (b) Part Two.}
```

---



See the “Tables and figures” section on page 17 for complete details on using the `\caption` command.

## 8 Tables and Figures

A table or figure number will be produced whenever the

```
\caption[title in LOT or LOF entry]{title in body of figure or table}
```

command appears within a `figure` or `table` environment. If the *title in the body of figure or table* is only one line, then it is centered; otherwise, it is hanging indented. You can use the *title in LOT or LOF entry* option to specify a shorter title for the List of Tables or List of Figures and to control line breaks (see the “Caption command” section on page 16). If you do not use this option, the *title in body of figure or table* will be used for their respective list entries.

For figures or tables that extend over multiple page see section 11.2 on page 31 for details on the `\captioncont` command to use for additional pages.

The `figure` and `table` environments are defined as

```
\begin{table}[loc] body \end{table}
```

or

```
\begin{figure}[loc] body \end{figure}
```

where *body* includes the `\caption` and the actual table or figure. Use the *loc* option to specify the location of the figure or table. You may find it difficult to convince L<sup>A</sup>T<sub>E</sub>X to put your figure or table where you want it, so it is highly recommended that you do not specify any location until your document is completed. This provides the greatest flexibility for table or figure placement in L<sup>A</sup>T<sub>E</sub>X.

The table or figure number is generated within the `\chapter` or `\appendix` command whenever a `\caption` is used. Therefore you may use `\caption` more than once within the table or figure environment. This is especially nice if you want two or more smaller tables or figures to be kept together on one page. The placement of the `\caption`

command is important too, since the `\caption` command should be before the table and after the figure.

**Note:** This environment is meant to create a floating area within your document (i.e., The location of the table or figure is not fixed. It may adjust or move within your document as you change text and the size of the tables or figures). It does NOT actually create a table or figure, you need to use the `tabular` environment for tables and `\includegraphics` command with `\usepackage{graphicx}` package to include an image for figures.

A typical table example might look like this.

---

```
\begin{table}
\caption{Table Example}
\begin{center}
\begin{tabular}{c|c}\hline
\multicolumn{2}{c}{All elements}\hline
1{st}$ & 2{nd}$\hline
1 & 2\hline
3 & 4\hline
\end{tabular}
\end{center}
\end{table}
```

---

## 8.1 Landscape table or figure

To rotate a table or figure to be landscape, you need to specify `\usepackage{graphicx}` in the preamble of your document in order to use the `\rotatebox` command. You must also use the `minipage` environment to define the correct page setup to rotate. Using this method will keep the page number at the bottom of the page in the correct location and orientation.

An example of a landscape table is shown on the next page and the resulting table 2 can be seen on page 20.

---

```

\begin{table}
\hbox to \textwidth{\hfill
\rotatebox{90}{%
\begin{minipage}{\textheight} % the height of the portrait page
\caption[Example 1 of Final Report of Maintenance Requests]
{Example 1 of Final Report of Maintenance Requests}\label{tab:1}
\vspace*{.5\baselineskip}
\begin{center}
\begin{tabular}{|r|r|r|r|r|}\hline\hline
\multicolumn{5}{|c|}{\bf Maintenance Request Form: Part I}\hline
\multicolumn{1}{|c|}{\bf Time} &
\multicolumn{1}{|c|}{\bf Number} &
\multicolumn{1}{|c|}{\bf Part No.} &
\multicolumn{1}{|c|}{\bf Requested by} &
\multicolumn{1}{|c|}{\bf Approved by}\hline\hline
100 & 31 & CR-123 & AZH & DS \\
1200 & 15 & L-34 & FTM & DS \\
1300 & 21 & K-245 & TUG & JR \\
200 & 120 & EZ-1 & FTM & DS \\
1000 & 122 & CR-50 & AZH & JR \\
1700 & 445 & W-347 & FTM & JR \\
300 & 12 & L-25 & FTM & DS \\
100 & 52 & L-13 & FTM & DS \\
2300 & 67 & EZ-25 & TUG & DS \\
500 & 99 & EZ-2 & FTM & JR \\
700 & 100 & EZ-5 & FTM & JR \\
1300 & 327 & W-400 & AZH & DS \\
1700 & 963 & C-80 & FTM & DS \\
\end{tabular}
\end{center}
\end{minipage}}\hfill}
\end{table}

```

---

**Table 2:** Example 1 of Final Report of Maintenance Requests

<b>Maintenance Request Form: Part I</b>				
<b>Time</b>	<b>Number</b>	<b>Part No.</b>	<b>Requested by</b>	<b>Approved by</b>
100	31	CR-123	AZH	DS
1200	15	L-34	FTM	DS
1300	21	K-245	TUG	JR
200	120	EZ-1	FTM	DS
1000	122	CR-50	AZH	JR
1700	445	W-347	FTM	JR
300	12	L-25	FTM	DS
100	52	L-13	FTM	DS
2300	67	EZ-25	TUG	DS
500	99	EZ-2	FTM	JR
700	100	EZ-5	FTM	JR
1300	327	W-400	AZH	DS
1700	963	C-80	FTM	DS

## 8.2 Side-by-side tables or figures

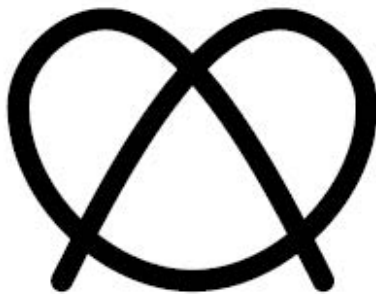
In order to put two tables or figures side-by-side, you must use the `minipage` environment to define the correct page setup. You also need to specify `\usepackage{graphicx}` in the preamble of your document in order to use the `\includegraphics` command. Using this method will ensure that the `\caption` command formats correctly.

An example of two figures side-by-side with one caption is shown below, and the resulting figure 1 can be seen on page 21 as well.

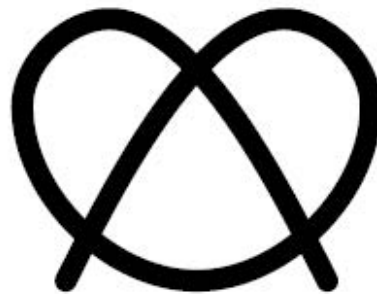
---

```
\begin{figure}
\begin{center}
\begin{minipage}[b]{2.25in}
\begin{center}
\resizebox{2.25in}{\}{\includegraphics{pretzel}}
(a) First Pretzel
\end{center}
\end{minipage}\hspace*{.375in}
\begin{minipage}[b]{2.25in}
\begin{center}
\resizebox{2.25in}{\}{\includegraphics{pretzel}}\
(b) Second Pretzel
\end{center}
\end{minipage}
\end{center}
\caption{Now presenting the side-by-side pretzels.}\label{fig:1}
\end{figure}
```

---



(a) First Pretzel



(b) Second Pretzel

**Figure 1:** Now presenting the side-by-side pretzels.

## 9 Creating and referring to cross-references

All references are created by using the `\label{key}` command where *key* is the word you use to refer to the number of the chapter, appendix, section, subsection, subsubsection, equation, figure, or table.

Once you have assigned this key, you can refer to the number (of the appropriate section, caption or equation) by using `\ref{key}` and to the appropriate page by using `\pageref{key}` (to refer to the page number). These commands do not insert text before the numbers. This means that you must insert the word “chapter,” “appendix,” “section,” “equation,” “figure,” or “table” before the `\ref` and `\pageref` commands. You should use a “~” between the proper word and the `\ref` and `\pageref` with no spaces before or after the “~” to prevent a line break from occurring between the proper word and the number that follows it. For examples, see the “Sectioning command” and “Tables and Figures” below.

**Note:** If you want to use a reference command within another command, like `\chapter`, `\section`, `\caption`, etc., then you must use `\protect` before that reference command. For example:

---

```
\begin{figure}
\includegraphics{pretzel}
\caption{Referencing another figure, see figure\protect\ref{fig1}}
\label{fig3}
\end{figure}
```

---

## 9.1 Sectioning commands

The next example illustrates references to a section and a subsection. References to all other sectioning commands would work in the same way.

---

```
\section{This is the first section}
\label{sec1}
In section one, we will present our hypothesis.

\subsection{This is the first subsection}
\label{ssec1}
In section~\ref{sec1} on page~\pageref{sec1}, you will
find the statement of our hypothesis. It is explained more fully in
section~\ref{ssec1} on page~\pageref{ssec1}.
```

---

## 9.2 Tables and Figures

The `\label` command must be placed after the `\caption` command in order to label the correct number for the table or figure. Below is an example that creates two figures in one figure environment and refers to them.

---

What you type:

```
\begin{figure}
\begin{center}
\includegraphics[width=.75in]{pretzel}
\end{center}
\caption{A pretzel in 1950}
\label{fig1}
\begin{center}
\includegraphics[width=.75in]{pretzel}
\end{center}
\caption{A pretzel in 2011}
\label{fig2}
\end{figure}
```

Figure~\ref{fig1} on page~\pageref{fig1} shows the first image of a pretzel in 1950 and figure~\ref{fig2} on page~\pageref{fig2} from 2011 with no change.

Result:



**Figure 2:** A pretzel in 1950



**Figure 3:** A pretzel in 2011

Figure 2 on page 24 shows the first image of a pretzel in 1950 and figure 3 on page 24 from 2011 with no change.

---

This example shows how to create a simple table and refer to it.

---

**What you type:**

```
\begin{table}
\caption{Table Example}\label{tab1}
\begin{center}
\begin{tabular}{c|c}\hline
\multicolumn{2}{c}{All elements}\\\hline
1$^{st}$ & 2$^{nd}$\\\hline
1 & 2\\
3 & 4\\hline
\end{tabular}
\end{center}
\end{table}
```

Table~\ref{tab1} on page~\pageref{tab1} shows an example of where to place a table caption.



**Result:**

**Table 3:** Table Example

All elements	
1 <sup>st</sup>	2 <sup>nd</sup>
1	2
3	4

Table 3 on page 25 shows an example of where to place a table caption.

---

### 9.3 Equations

To refer to an equation number, you must use one of the math environments that number equations. They are

```
\begin{equation} formula \end{equation}
```

or

```
\begin{eqnarray} formula \end{eqnarray}
```

where *formula* is the math equation that you supply. To define a label for an equation number, you must put the `\label{key}` command on the line of the formula to which you want to refer.

The following example shows how to generate equation numbers for a single and a multilined equation.

---

**What you type:**

```
\begin{equation}
x = {x \over 2} \label{equ1}
\end{equation}
```

```
\begin{eqnarray}
x & = & 17y \label{equ2} \\
y & > & a+b+c+d+ \nonumber \\
& & e+f+g
\end{eqnarray}
```

Equation~\ref{equ1} on page~\pageref{equ1} is an example of a simple displayed equation and equation~\ref{equ2} on page~\pageref{equ2} is an example of a multilined equation.

**Result:**

$$x = \frac{x}{2} \tag{1}$$

$$x = 17y \tag{2}$$

$$y > a + b + c + d + e + f + g \tag{3}$$

Equation 1 on page 26 is an example of a simple displayed equation and equation 2 on page 26 is an example of a multilined equation.

---

## 10 Bibliography or References

In  $\text{\LaTeX}$ , you can create a bibliography or list of references in two ways. You can either produce a list of sources yourself or use a separate program called  $\text{\BIBTeX}$  to generate a list from information you have stored in a bibliographic database.

### 10.1 Using $\text{\BIBTeX}$

$\text{\BIBTeX}$  is a separate program from  $\text{\LaTeX}$ . This program creates a **.bib** file that will be read by  $\text{\LaTeX}$  to create references to sources that you cite in your document with the `\cite` command. The **.bib** file that  $\text{\BIBTeX}$  creates is taken from a bibliographic database file that contains information about your sources. This database file must have the extension **.bib** and must follow a specific format. Once you have created the **.bib** file, use

```
\bibliography{file(s)}
```

where *file(s)* is the name of your **.bib** file or files to generate your bibliography. If you have more than one bibliographic database file, separate each file name with a comma. For example, if you have two databases—*sample1.bib* and *sample2.bib*, you would use the form `\bibliography{sample1,sample2}`.

After you have included your database files, you must specify a bibliography style file with the command

```
\bibliographystyle{type}
```

where *type* can be one of four standard styles:

- **plain**—sorted alphabetically with numbered labels
- **unsrt**—listed in order of citing in the text; numbered labels
- **alpha**—sorted alphabetically with labels formed from the author’s name and the year of publication
- **abbrv**—same as **plain** except that first names, and names of months and journals are abbreviated

A typical BIB<sub>T</sub>E<sub>X</sub> example might look like this.

---

```
\bibliography{sample}
\bibliographystyle{plain}
```

---

**Note:** If you want to cite a reference within another macro, like `\chapter`, `\section`, `\caption`, etc., then you must use `\protect` before that `cite` command. In the example below, the figure source is cited in the `\caption` command.

---

```
\begin{figure}
\includegraphics{fig4}
\caption{Very important figure\protect\cite{Abr86}}
\label{fig4}
\end{figure}
```

---

There are many other BIB<sub>T</sub>E<sub>X</sub> style packages such as `natbib`, `asgm`, etc. that can be used instead of the standard styles, but keep in mind that some of the automatic formatting provided by the UDThesis class may be redefined as well. Most likely, the title of your bibliography will not be “Bibliography,” you will not get an entry in the Table of Contents, and the spacing may not be correct (single-spaced items, but double-spaced between items).

The simplest way to fix these is to redefine `\bibname` command to change the title of your bibliography, use the `addcontentsline` command, and specify `\usepackage{setspace}` in the preamble of your document.

Here is a simple main document file that uses BibTeX:

---

```
\documentclass{udthesis}
\usepackage{natbib}
\usepackage{setspace}
\begin{document}
\include{tap}
\include{chap1}
....
\renewcommand{\bibname}{BIBLIOGRAPHY}
\phantomsection
\addcontentsline{toc}{chapter}{Bibliography}
\begin{singlespace}
\bibliography{sample}
\end{singlespace}
\bibliographystyle{agsm}
....
\include{appA}
\include{appB}
\end{document}
```

---

## 10.2 Creating your own list of sources

To create your own list of sources, use **thebibliography** environment whether you want your list of references to be called “REFERENCES” or “BIBLIOGRAPHY.” Begin the environment with

```
\begin{thebibliography}{label width}
```

and end it with

```
\end{thebibliography}
```

The `thebibliography` environment is like the  $\LaTeX$  list environments except that

- Each item begins with a `\bibitem` command. This command is followed by a key by which the item can be cited in the text with a `\cite` command.
- The `thebibliography` environment includes a *label width*, that is, a number or series of letters that is the same width as or slightly wider than the widest item label in your list of sources. (For example, if your list has 500 entries, you might choose “999” as your label width because “999” is as wide as all other three-digit numbers.)

The following example shows how you would create your list of sources with `thebibliography` environment, cite the reference, and change the title of your sources to “References” rather than “Bibliography”.

---

```
\renewcommand{\bibname}{References}
\begin{thebibliography}{999}
\bibitem{Catt1} Cattell, R.B. 1966. ‘‘The Screen Test for the Number of
    Factors.’’ {\it Multivariate Behavior Research}, 1: 245-276.
\end{thebibliography}
```

```
See \cite{Catt1} for more information on the test.
```

---

## 11 Additional environments and commands

### 11.1 Hanging indent references

Use the `thereferences` environment to create hanging indent references. This environment is generally used for lists of sources with no automatic citation (e.g. `\cite`) used in the body of the document.

---

**What you type:**

```
\begin{thereferences}
Leslie Lamport, \textit{\LaTeX: \textit{A Document Preparation System}} (User’s
Guide and Reference Manual), 1986, Addison-Wesley, Reading, Massachusetts.

Donald Knuth, \textit{The \TeX book}, 1986, Addison-Wesley, Reading,
Massachusetts.
\end{thereferences}
```

**Result:**

## REFERENCES

Leslie Lamport, *L<sup>A</sup>T<sub>E</sub>X: A Document Preparation System* (User's Guide and Reference Manual), 1986, Addison-Wesley, Reading, Massachusetts.

Donald Knuth, *The T<sub>E</sub>Xbook*, 1986, Addison-Wesley, Reading, Massachusetts.

---

This will produce the title **REFERENCES**; however, you can specify a different title by redefining the `\bibname` command before the `thereferences` environment.

---

```
\renewcommand{\bibname}{Bibliography}
\begin{thereferences} .. \end{thereferences}
```

---

### 11.2 Caption for multipage tables and figures

Sometimes a table or figure may extend over multiple pages, and a caption must appear on each page, but the number should stay the same. UDThesis document class provides the `\captioncont` to be used for all additional pages after the first `\caption` command. The `\captioncont` command will automatically keep the number the same for the table or figure and not make an entry in the list of tables or figures.

---

What you type:

```
\begin{table}
\caption{First part of a much longer table}
\begin{center}
\begin{tabular}{c|c}\hline
\multicolumn{2}{c}{All elements in the first page}\\\hline
1st & 2nd \\
3 & 4 \\
\end{tabular}
\end{center}
\end{table}
```

```
\begin{table}
\captioncont{continued}
\begin{center}
\begin{tabular}{c|c}\hline
\multicolumn{2}{c}{All elements in the second page}\\\hline
1st & 2nd \\
3 & 4 \\
\end{tabular}
\end{center}
\end{table}
```

Result:

**Table 1.1:** First part of a much longer table

---

All elements in the first page	
<i>1<sup>st</sup></i>	<i>2<sup>nd</sup></i>
1	2
3	4

**Table 1.1:** continued

---

All elements in the second page	
<i>1<sup>st</sup></i>	<i>2<sup>nd</sup></i>
1	2
3	4

---



### 11.3 Glossary or List of Symbols

To create a glossary or list of symbols, use the `desc` list environment along with `\prefacesectiontoc` to provide the correct title.

---

**What you type:**

```
\prefacesectiontoc{Glossary}
\begin{desc}
\item[cat] A carnivorous mammal domesticated since early times
as a catcher of rats and mice and as a pet.
\item[mouse] Any of numerous small rodents of the families Muridae
and Cricetidae, such as the common house mouse, characteristically
having a long, naked or almost hairless tail.
\item[mousetrap] A trap for catching mice.
\end{desc}
```

**Result:**

#### GLOSSARY

<b>cat</b>	A carnivorous mammal domesticated since early times as a catcher of rats and mice and as a pet.
<b>mouse</b>	Any of numerous small rodents of the families Muridae and Cricetidae, such as the common house mouse, characteristically having a long, naked or almost hairless tail.
<b>mousetrap</b>	A trap for catching mice.

---

This will align all definitions after the words or symbols. A maximum label width of one inch is provided for each item.