Introduction

Learning LaTeX, a software with powerful typesetting capabilities, is no more difficult than mastering a word processing software with an equation editor. LaTeX can number and remember equations, figures and tables automatically, insert numbers in the body of thesis, automate the labeling of references and insertion of these labels in the text. It can also modify font size and type according to your instructions and generate tables of content, nomenclature and indexes.

The purpose of this document; titled *"Your thesis with LaTeX in 6 steps"* is to introduce LaTeX, and outline the steps that lead to a printed document conforming to IIT thesis style, while providing tips on the use of various LaTeX commands. Introductory information about the software, its installation and its basic layouts and commands will be presented first. Then the style file (*iitthesis.cls*) containing the thesis format required by IIT, plus a sample thesis file (*sample.tex*) and some help files on tables, figures and bibliography are introduced.

Using the *iitthesis.cls* style file in your thesis project file, you just need to follow the format and instructions available in help files - and review the sample file if necessary - to successfully create your thesis in LaTeX.

STEP 1: What is LaTeX?

To use LaTeX, a TeX program is required which is a computer program for typesetting documents. It is not a word processor, i.e. you have to type a source file containing special typesetting commands using a text editor and then process the file by means of TeX or LaTeX.

Simple documents that do not contain mathematical formulae or tables may be produced very easily. Typesetting mathematics is somewhat more involved, but even here TeX is comparatively straightforward to use considering the complexity of the formulae that it is required to typeset. The software has also facilitates for the development of equations.

LaTeX is a TeX macro package which enables authors to typeset and print their work at the highest typographical quality, using a predefined, professional layout. It is particularly suited to the production of long articles and books, since it has capability for the automatic numbering of chapters, sections, theorems, equations etc., and can automate cross-referencing. LaTeX2e is probably one of the most suitable versions of LaTeX for beginners to use.

 LaTeX program reads in text from an input file, which is a text file with .tex extension, and creates a `DVI file' which encodes information on the fonts to be used and the positioning of the characters on the printed page. The text file can be developed using text editors like MS Notepad or iv, word processors such as MS Word or WordPerfect or text editors especially created for editing TeX and LaTeX files like WinEdt. Many programs are available to translate the `DVI file' into page description languages such as `PostScript', convert it into the format appropriate for previewing the document on a computer screen, e.g. PDF, or for printing it.

STEP 2: Why use LaTeX?

If you are writing a document with many expressions, equations, tables, and cross-references and you need to format the document and bibliography to suit various publications, then LaTeX is the best choice. All cross-references, bibliography and indexing is handled automatically by LaTeX. In addition, there is no need for manual renumbering of figures, tables and formulae when you make changes to the document.

LaTeX has several advantages:

- It's free. (You may download MikeTex 2.3 for free)
- LaTeX is extensible. If you want a new feature, you can look around for a free add-on or write one yourself.
- It is simply the best package for documents containing mathematics.
- It is portable with the use of standard commands and everyone can read and exchange documents.
- The source file is purely alphanumeric. It can be read by eye or posted by e-mail avoiding problems associated with different versions or binary files.
- Despite its reputation for being difficult to use, LaTeX is effectively the same as HTML!
- There is a vast library of styles and packages available.

The only disadvantage is that LaTeX it is not WYSIWIG.

STEP 3: Where to provide & How to install?

MikTeX 2.3 and Winedt 5.3 programs are the most commonly used. MikTeX is an implementation of TeX program for Windows, and it is open source. It can be downloaded from the website:http://www.miktex.org/index.html

WinEdt is a Windows TeX editor. The program provides a graphical interface making it user friendly. The program may be used for an evaluation period of 31 days: http://www.winedt.com/

Also, Ghostscript and Ghostview PostScript interpreters are required as a graphical interface. The AFPL Ghostscript 8.00 and Ghostview 4.4 releases are used during the development of the style file. They may be downloaded from the website: http://www.cs.wisc.edu/~ghost/doc/AFPL/get800.htm

STEP 4: Some Basics

- **Input File:** The input for LaTeX is a plain ASCII text file. You can create it with any text editor. It contains the text of the document as well as the commands that tell LaTeX how to typeset the text.

- **Spaces:** "White space" characters (blank space characters) such as blank or tab are treated uniformly as "space" by LaTeX. Several consecutive white space characters are treated as one "space". White space at the start of a line is ignored. A single line break is treated as "white space". An empty line between two lines of text defines end of paragraph. Several empty lines are treated the same as one empty line.

  See Example:

  It does not matter whether you enter one or several   spaces after a word.

  An empty line starts a new paragraph.

  > It does not matter whether you enter one or several spaces after a word.
  >
  > An empty line starts a new paragraph.

- **Special Character:** The following symbols are reserved characters that either have a special meaning under LaTeX or are not available in all the fonts. If you enter them directly in your text, they will normally not print, but rather cause LaTeX to do things you did not intend. $ & % # _ { } ~ ^ \

  These characters can be used in your documents by adding a prefix backslash: \$ \&   \%   \#   _   \{   \}   \~   \^

Other symbols can be printed with special commands mathematical formulae or as accents. The backslash character cannot be entered by adding another backslash in front of it (\\), this sequence is used for line breaking.

- Commands: LaTeX commands are case sensitive and start with a backslash \ and then have a name consisting of letters only. LaTeX ignores white space after commands. If you want to get a space after a command, you have to put either {} and a blank or a special spacing command after the command name. The {} stops LaTeX from eating up all the space after the command name. Some commands need a parameter which has to be given between curly braces { } after the command name. Some commands support optional parameters which are added after the command name in square brackets [ ].

    \\ or *\newline* command orders LaTeX to break a line and start a new line without starting a new paragraph. *\newpage* command starts a new page.

    See Example:

Quiet a few \textsl{essential tips} will be mentioned here.\newline First:	Quiet a few *essential tips* will be mentioned here. First:

    For a complete reference on LaTeX commands, follow the link below:

    http://www.emerson.emory.edu/services/latex/latex_toc.html

- Comments: When LaTeX encounters a % character while processing an input file, it ignores the rest of that line, the line break, and all white space at the beginning of the next line. **See Example:**

This is an % referred to part 2 % Look at the page 3 example: Antropomaximology	This is an example: Antropomaximology

- Structure & Layout: When LaTeX processes an input file, it expects it to follow a certain structure. The first information LaTeX needs to know when processing an input file is the type of document the author wants to create. This is specified with the **\documentclass[***options***]{***class***}** *command.* Here class specifies the type of document to be created. After that, you can include commands that influence the style of the whole document, or you can load packages that add new features to the LaTeX system. While writing your document, you will probably find that there are some areas where basic LaTeX cannot solve your problem. If you want to include graphics, colored text or source code from a file into your document, you need to enhance the capabilities of LaTeX. Such enhancements are called packages. Packages are activated with **\usepackage[***options***]{***package***}** command where package is the name of the package and options is a list of keywords which trigger special features in the package.

  When all the setup work is done, you start the body of the text with the command **\begin{***document***}.** You then enter the text mixed with the appropriate LaTeX commands. At the end of the document you add the **\end{***document***}** command. Anything that follows this command will be ignored by LaTeX.

  See Example:
```
\documentclass[a4paper,11pt]{article}
\usepackage{latexsym}
\author{H.~Partl}
\title{Minimalism}
\begin{document}
\maketitle
\tableofcontents
\section{Start}
Well, and here begins my lovely article.
\section{End}
\ldots{} and here it ends.
\end{document}
```

STEP 5: Thesis Style File and Help File
(What we have provided to simplify your way)

iitthesis.cls is a style file provided for writing Master or PhD thesis according to Illinois Institute of Technology thesis format using LaTeX, LaTeX2e. This style file has some variations from the Thesis Manual in style of List of Figures and List of Tables. However, these changes have been approved by the thesis examiner. All thesis manual layout requirements such as, front page, acknowledgement page, table of contents, list of tables, list of figures, abstract, appendix, bibliography & index are defined in the style file. You should include the *iitthesis.cls* file at the beginning of your file and familiarize yourself with the "macro" commands defined in style file. Looking at *sample.tex* sample file may be a great help in this regard. Note that these "macro" commands, which are defined in style file, are different from LaTeX own commands although the names may be similar (e.g. **\Chapter{}**, **\Section{}**)

Four help files are also provided:

- o *Style Help (pdf)* describes how to use the style file and run LaTeX.
- o *Table Help (pdf)* includes detailed information about making tables.
- o *Figure Help (pdf)* provides info about including figures in your thesis.
- o *Bibliography Help (pdf)* contains instructions for making bibliography.

Some examples are also included in these files.

STEP 6: Sample File and Your Thesis
(What you need to do to begin with)

The **sample.tex** is a sample file prepared using the **iitthesis.cls** style file. It is recommended that you run this sample file in LaTeX and see the dvi or pdf output files that are generated in the same folder. Note that the style file should be in the same folder as your tex file (**sample.tex)** to avoid compile errors. The font files (**font12.clo**, **font11.clo**) should also be in that folder.

Begin by making a folder (e.g. mythesis) on your disk and copy **iitthesis.cls** style file and **font12.clo**, **font11.clo** font files there. Open a new file in your editor (e.g. WinEdt) and save it in mythesis folder. Then define the style file for your thesis using **/documentclass{}** command. You may easily copy and paste the needed macro commands from **sample.tex** into your file and change the arguments only. You can compile your file and make dvi, ps or pdf outputs any time during your work. If your thesis has a bibliography, the following steps should be taken to generate correct outputs:

1. Run LaTeX, generating a list of \cite references in its auxiliary file (.aux).

2. Run BibTeX, which reads the auxiliary file, and looks up the references in databases (.bib files) and writes a file with bbl extension.

3. Run LaTeX again, which reads the bbl file

4. Run LaTeX a third time, resolving all references.

If you are using WinEdt, you need to click on dvi preview icon to generate the dvi file and view it. To create the pdf output file, first do dvi to ps conversion by clicking on , and then ps to pdf conversion with icon. Note that a pdf file created with a conversion from dvi to pdf directly will not contain eps figures at the pdf output file.