

INTRODUCTION TO LATEX

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Research Skills

Let's get some stuff first

Download

- <http://miktex.org/portable>
- TexStudio: <http://texstudio.sourceforge.net/> (or any other editor)

Alternatively this is also available from the student share (markus hofmann)

Mac

- E.g.: Engine - <http://www.tug.org/applications/pdftex/>
- E.g.: Editor - <http://pages.uoregon.edu/koch/texshop/>

References

Presentation includes material from

- Troy D. Milner
- Simon Cuce
- David Reitter (MIT)

Introduction

As you've already mastered the Microsoft Word Application we will concentrate on LaTeX!!!!!!

TeX is essentially a Markup Language (like HTML, XML and RTF)

TeX written by Donald Knuth in the 70's

- A revolution in typesetting

LaTeX is an extension of TeX

- Macro packages to make TeX easier to use

LaTeX vs. Word Processors

High typeset quality

Easy to include math formulas

Source file format is not bounded to a particular OS or platform

LaTeX implementations exists for all platforms (DOS, Windows, MAC)

LaTeX is free

De facto standard for scientific publishing

Very few bugs

Good for large documents

Not as easy to learn

Why use LaTeX

Formatting styles are persistent (not like in Word)

Clear focus on content as TeX looks after the layout

Increases productivity

LaTeX/Word Comparison

	LaTeX/BiBTeX	Microsoft Word
Stylesheets	yes	yes, not great/robust
Logical Sectioning	yes	yes
Cross-References	yes	yes, so so...
Bibliography management	yes	no (endnote = cost)
floating figures / tables	yes	non-persistent
graphics	limited	limited
unicode (äöüß)	no	yes
typographic quality	High and enforced	low
built-in spell / grammar check	no	yes
WYSIWYG	limited	yes
graphical user interface	limited	yes
import/export to	HTML, ASCII	many options
cross-platform	yes	most
cooperation functions	none	some
extensions	packages, Tex	VBA
learning curve	high	low
cost	free	expensive

Example of LaTeX document

```
\documentclass{article}  
\title{Simple Example}  
\author{Andrei Gurtov}  
\date{March 2000}  
\begin{document}  
\maketitle  
Hello world!  
\end{document}
```


Creating LaTeX Files

Your LaTeX File (a text file)

Your Bibtex File



LaTeX compile x3



Bibtex compile x2



LaTeX compile x3

Device independent
output .dvi



dvips compile x1

Your Postscript File



LaTeX File Structure

Document Class

Predefined Formats (article, report, book,..).

Or create your own

Packages used

Added Functionality (graphics, reference style,...).

Hundreds of packages available or write your own

Main Body

Text and Bibliography References.

What you need...

Tex installation

- MikTex (<http://miktex.org/>)
- MikTex **portable** (<http://miktex.org/portable/about>)

Text Editor

- Have a look here http://en.wikipedia.org/wiki/Comparison_of_TeX_editors
- I like WinEdt (it is however not entirely free)
- TexStudio is **portable**

Understanding LaTeX

`\` is used to start command names

`%` is used to start a comment

`& $ # _ ^ { }` and `~` are special characters

Words are separated by one or more spaces. Paragraphs are separated by one or more blank lines.

The output is not affected by adding extra spaces or extra blank lines to the input file.

The Basics

Document Class

```
\documentclass[options]{class}  
options = a4paper, 11pt, 12pt, 10pt, twocolumn, landscape,...  
class = article, report, book,...
```

Packages

```
\usepackage{package name}  
epsfig = insert PS pictures into the  
document  
fancyhdr = easy definition of footer and  
header
```

Body of Text

Start with `\begin{document}`

End with `\end{document}`

Typesetting Text

- `\\` or `\newline` and `\newpage`
- Quotations
- Bold `\textbf{.....}` or `\bf`
- Italics `\emph{.....}` or `\textit{.....}` or `\it`
- Underline `\underline{.....}` or `\ul`

Format

Sections

- `\section{...}` = 1. LaTeX is Great
- `\subsection{...}` = 1.1 Why LaTeX is Great
- `\subsubsection{...}` = 1.1.1 Reason One
- `\appendix` - changes numbering scheme
- `\chapter{...}` - To be used with book and report document classes

Titles, Authors and others

- `\title{...}` `\author{...}`
- `\footnote{...}`

Including Multiple Files

- `\input{filename.tex}`

Format Contd.

`\maketitle` - Display Title and Author

`\tableofcontents` - generates TOC

`\listoftables` - generates LOT

`\listoffigures` - generates LOF

Labels

- `\label{marker}` - Marker in document.
- `\pageref{marker}` - Displays page no. of marker.
- `\ref{marker}` - Displays section location of marker.

Itemize

- Use either *enumerate*, *itemize* or *description*.
- *see handout for example.*

Lists

Source

- `\begin{itemize}`
- `\item Apple`
- `\item Orange`
- `\end{itemize}`

Result

- Apple
- Orange

`Enumerate` instead of `itemize` gives a numbered list

Lists can be nested

Environment

Something between

- `\begin{name}`
- `\end{name}`

Many command, for example `\bf` affect the text until the end of environment

Environments can be nested

Examples:

- `itemize`, `center`, `abstract`

Group

Group is some text between { and }

Many commands work until the end of the group

Code

- put one word `\bf { in bold}` here

Result

- put one word **in bold** here

Alignment

Environments `center`, `flushleft`, `flushright`

Example

- `\begin{flushright}`
- Right aligned
- `\end{flushright}`

Result

Right aligned

Font size

`\tiny \scriptsize \footnotesize`

`\small \normalsize`

`\large \Large`

`\LARGE \huge`

`\Huge`

Tabular

Two Columns

```
graph TD; A[Two Columns] --> B[Columns]; A --> C[Rows]; A --> D[Legend];
```

Columns

- `\begin{tabular}{|...|...|}`
- `\end{tabular}`

Rows

- `&` - Split text into columns
- `\\` - End a row
- `\hline` - Draw line under row
- e.g. `123123 & 34.00\\ \hline`

`l` = automatically adjust size, left justify
`r` = automatically adjust size, right justify
`p` = set size
e.g `p{4.7cm}`
`c` = centre text

Example of table

```
\begin{tabular}{|l|r|c|} \hline
Date & Price & Size \\ \hline
Yesterday & 5 & big \\ \hline
Today & 3 & small \\ \hline
\end{tabular}
```

Date	Price	Size
Yesterday	5	Big
Today	3	Small

Floating Objects

Floating objects can stop splitting of tables and images over pages.

```
\begin{figure} [options]
```

```
\end{figure}
```

```
\begin{table} [options]
```

```
\end{table}
```

They will now appear in the

- List of Figures (LOF) and
- List of Tables (LOT).

Options (recommendations)

h = place table here

t = place at top of page

b = place at bottom of page

Example of floating figure

```
\begin{figure}[ht]
```

```
\centering\epsfig{file=uni.ps, width=5cm}
```

```
\caption{University of Helsinki}
```

```
\label{uni}
```

```
\end{figure}
```



Figure~\ref{uni}
shows...

Images

Use epsfig package

```
\usepackage{epsfig}
```

Including images in main body

```
\epsfig{file=filename.eps, width=10cm,  
height=9cm, angle=90}
```

Creating EPS

MS Power Point, save as GIF and convert to EPS.

Bibliography by hand

```
\begin{thebibliography}{}

```

```
\bibitem[Come95]{Come95} Comer,
D. E., {\it Internetworking with TCP/IP:
Principles, Protocols and Architecture},
volume 1, 3rd edition. Prentice-Hall,
1995.
```

```
\end{thebibliography}

```

Bibliography using Bibtex

Bibliography information is stored in a *.bib file, in Bibtex format.

Include chicago package

- `\usepackage{chicago}`

Set referencing style

- `\bibliographystyle{chicago}`

Create reference section by

- `\bibliography{bibfile with no extension}`

Bibliography using Bibtex

```
@book{Come95,  
author="D. E. Comer",  
title={Internetworking with TCP/IP: Principles, Protocols and  
Architecture},  
publisher="Prentice-Hall",  
year=1995,  
volume=1,  
edition="Third"}
```

Bibliography contd.

Citing references in text

- `\cite{cuc98}` = (Cuce 1998)
- `\citeN{cru98}` = Crud (1998)
- `\shortcite{tom98}` = (Tom, et. al. 1998)

Creating Bibtex Files

- Use Bibtex entries from bibliography database.

Some Math

`\begin{center}`

`{\large`

`$$ y=\frac{a^3+2c_{\{x\}}{1+\sqrt{b_{\{x\}}}} $$ \\\`

`\vspace{0.2in}`

`$$ Q=\sum_{i=1}^j\int_{\mu}^{\infty}f(x_{\{j\}})dx $`

`\vspace{0.2in}`

`$$ \Psi = \oint_{-\infty}^{\infty}f_{\{xy\}}(\frac{\partial}{\partial x}`

`Qx}{\partial Qy}})^{\Im_{\pi}^{\prime}} $$ \\\}`

$$y = \frac{a^3 + 2c_x}{1 + \sqrt{b_x}}$$

$$Q = \sum_{i=1}^j \int_{\mu}^{\infty} f(x_j) dx$$

$$\Psi = \oint_{-\infty}^{\infty} f_{xy} \left(\frac{\partial Q_x}{\partial Q_y} \right) \mathfrak{I}_{\pi}'$$

Conclusion

LaTeX is optimal for your project thesis?

Mathematical formulae are easy.

Use bibtex search engines

More robust than Microsoft Word or Open Office product

Free

Easy to create presentations from existing LaTeX files