



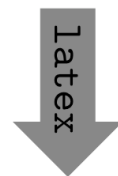
# A Crash Course on LaTeX

Discussion Section – April 24

# Why LaTeX?

- LaTeX is a typesetting systems suitable for producing scientific and mathematical documents
  - LaTeX enables authors to typeset and print their work at the highest typographical quality
  - LaTeX is pronounced “Lay-tech”.
  - LaTeX uses TeX formatter as its typesetting engine.

The rain in Spain falls `\emph{mainly}` on the plain.



The rain in Spain falls *mainly* on the plain.

# Why LaTeX?

- High quality

$$J[x(\cdot), u(\cdot)] = \int_{t_0}^{\infty} F(x(t), u(t), t) dt$$

**Word**

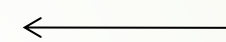
$$J[x(\cdot), u(\cdot)] = \int_{t_0}^{\infty} F(x(t), u(t), t) dt$$

**LaTeX**

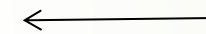
- Easy to use, especially for typing mathematical formulas
- Portability (Windows, Unix, Mac)
- But most likely, you will be forced to use it, since everyone else around you is using it.

# Setting up LaTeX

- Download and install MikTeX
- <http://www.miktex.org/>
- Install Ghostscript and Gsview
- <http://pages.cs.wisc.edu/~ghost>



LaTeX package



PS device driver

- Install Acrobat Reader
- Install Editor
- WinEdt
- Or use online LaTeX editors: **Overleaf**, **Sharelatex..**

## For MAC Users

TeXShop  
iTexMac  
Texmaker

...



# Basic Structure



**`\documentclass [12pt]{article}`** Define the types of the document  
(article, book, thesis ...)

**`\usepackage {color}`**  
**`\usepackage {graphicx}`** Preamble. Incorporate packages or  
define macros here

**`\begin{document}`**

Main body, stuff to be printed, title,  
authors, abstract, sections,  
references, ....

**`\end{document}`**



# Basic Document Structure



```
\begin{document}  
  \title {A Very Simple Introduction to LaTeX}  
  \author {names}  
  \thanks{names}  
  ...  
  \maketitle  
  
  ...  
\section{Introduction}  
\subsection{Subsection Heading Here}  
\end{document}
```

# Environments

```
\begin{env_name}  
stuff  
\end{env_name}
```

Environment name (env\_name) can be document, itemize, enumerate, tabular, etc.

```
\begin{itemize}  
  \item The first item  
  \item The second item  
\end{itemize}
```



- The first item
- The second item

```
\begin{enumerate}  
  \item The first item  
  \item The second item  
\end{enumerate}
```



- 1) The first item
- 2) The second item

## More examples..

```
\begin{itemize}
\item Tea
\item Milk
\item Biscuits
\end{itemize}
```

- Tea
- Milk
- Biscuits

```
\begin{figure}
\includegraphics{chick}
\end{figure}
```



```
\begin{equation}
\alpha + \beta + 1
\end{equation}
```

$$\alpha + \beta + 1 \quad (1)$$





# Figures

You can insert figures in pdf, jpg, eps, and other formats into your document.

```
\begin{figure}  
  \centering  
  \includegraphics {name of the figure file}  
  \caption{Put the caption here}  
\end{figure}
```

**Multiple figures can be inserted using \subfigure**

# Tables

An example to show how to generate tables

```
\begin{center}
\textbf{Table 1: Number of MIDs at Hostility\\ Level 3 or More by Year}\\
\begin{tabular}{lccc} \hline \hline
\bfseries $$ & \bfseries & \quad Freq. & \bfseries & \quad Percent & \bfseries \\
\quad Cum. & & & & & \\
\hline \hline
0 & & 10,241 & & 86.41 & 86.41 \\
1 & & 1,198 & & 10.11 & 96.52 \\
2 & & 278 & & 2.35 & 98.86 \\
3 & & 83 & & 0.70 & 99.56 \\
4 & & 22 & & 0.19 & 99.75 \\
5 & & 11 & & 0.09 & 99.84 \\
6 & & 7 & & 0.06 & 99.90 \\
7 & & 2 & & 0.02 & 99.92 \\
8 & & 1 & & 0.01 & 99.92 \\
9 & & 2 & & 0.02 & 99.94 \\
10 & & 2 & & 0.02 & 99.96 \\
11 & & 1 & & 0.01 & 99.97 \\
14 & & 2 & & 0.02 & 99.98 \\
15 & & 1 & & 0.01 & 99.99 \\
23 & & 1 & & 0.01 & 100.00 \\
\hline \hline
\end{tabular}
\end{center}
```

		Freq.		Percent	
0		10,241		86.41	86.41
1		1,198		10.11	96.52
2		278		2.35	98.86
3		83		0.70	99.56
4		22		0.19	99.75
5		11		0.09	99.84
6		7		0.06	99.90
7		2		0.02	99.92
8		1		0.01	99.92
9		2		0.02	99.94
10		2		0.02	99.96
11		1		0.01	99.97
14		2		0.02	99.98
15		1		0.01	99.99
23		1		0.01	100.00

# Output

**Table 1: Number of MIDs at Hostility  
Level 3 or More by Year**

<i>N</i>	Freq.	Percent	Cum.
0	10,241	86.41	86.41
1	1,198	10.11	96.52
2	278	2.35	98.86
3	83	0.70	99.56
4	22	0.19	99.75
5	11	0.09	99.84
6	7	0.06	99.90
7	2	0.02	99.92
8	1	0.01	99.92
9	2	0.02	99.94
10	2	0.02	99.96
11	1	0.01	99.97
14	2	0.02	99.98
15	1	0.01	99.99
23	1	0.01	100.00

# Special Characters

- ▶ Quotation marks are a bit tricky: use a backtick ``` on the left and an apostrophe `'` on the right.

Single quotes: <code>'text'</code> .	Single quotes: <code>'text'</code> .
Double quotes: <code>“text”</code> .	Double quotes: <code>“text”</code> .

- ▶ Some common characters have special meanings in  $\text{\LaTeX}$ :

`%`

percent sign

`#`

hash (pound / sharp) sign

`&`

ampersand

`$`

dollar sign

# Typesetting Mathematics: Dollar Sign

- ▶ Why are dollar signs  $\$$  special? We use them to mark mathematics in text.

*% not so good:*

Let  $a$  and  $b$  be distinct positive integers, and let  $c = a - b + 1$ .

Let  $a$  and  $b$  be distinct positive integers, and let  $c = a - b + 1$ .

*% much better:*

Let  $a$  and  $b$  be distinct positive integers, and let  $c = a - b + 1$ .

Let  $a$  and  $b$  be distinct positive integers, and let  $c = a - b + 1$ .

- ▶ Always use dollar signs in pairs — one to begin the mathematics, and one to end it.
- ▶  $\LaTeX$  handles spacing automatically; it ignores your spaces.

Let  $y=mx+b$  be  $\ldots$

Let  $y = mx + b$  be  $\ldots$

Let  $y = m x + b$  be  $\ldots$

Let  $y = mx + b$  be  $\ldots$

# Typesetting Mathematics: Notation

- ▶ Use caret  $\wedge$  for superscripts and underscore  $\_$  for subscripts.

$\text{\textcolor{red}{$}y = \text{\textcolor{green}{c\_2}} x^2 + \text{\textcolor{green}{c\_1}} x + \text{\textcolor{green}{c\_0}}\text{\textcolor{red}{$}}}$	$y = c_2x^2 + c_1x + c_0$
--	---------------------------

- ▶ Use curly braces  $\{$   $\}$  to group superscripts and subscripts.

$\text{\textcolor{red}{$}F\_n = F\_n-1 + F\_n-2\text{\textcolor{red}{$}} \quad \% \text{\textcolor{teal}{oops!}}$	$F_n = F_n - 1 + F_n - 2$
$\text{\textcolor{red}{$}F\_n = F_{\text{\textcolor{green}{n-1}}} + F_{\text{\textcolor{green}{n-2}}}\text{\textcolor{red}{$}} \quad \% \text{\textcolor{teal}{ok!}}$	$F_n = F_{n-1} + F_{n-2}$

- ▶ There are commands for Greek letters and common notation.

$\text{\textcolor{blue}{$\mu}} = A \text{\textcolor{green}{e}}^{\text{\textcolor{blue}{Q/RT}}}\text{\textcolor{red}{$}}$	$\mu = Ae^{Q/RT}$
$\text{\textcolor{blue}{$\Omega}} = \text{\textcolor{green}{\sum_{k=1}^n}} \text{\textcolor{blue}{\omega}}_k\text{\textcolor{red}{$}}$	$\Omega = \sum_{k=1}^n \omega_k$



# Typesetting Mathematics: Equations

- ▶ If it's big and scary, *display* it on its own line using `\begin{equation}` and `\end{equation}`.

The roots of a quadratic equation  
are given by

```
\begin{equation}
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\end{equation}
where $a$, $b$ and $c$ are \ldots
```

The roots of a quadratic  
equation are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (2)$$

where  $a$ ,  $b$  and  $c$  are ...

Caution:  $\text{\LaTeX}$  mostly ignores your spaces in mathematics, but it can't handle blank lines in equations — don't put blank lines in your mathematics.

# How to cite references?

- Using .bib file, we create a list of references
- After importing, we cite them in our main document using the command **\cite**
- Formatting:
  - I. Author1 and J. Author2. “The title of the paper.” Name of Journal, vol(#), month year OR
  - I. Author1, J. Author2 and K. Author3. “The title of the paper.” Proceedings of the Name of the Conference, location, month year.
- Suppose we have to generate something like this..

Some famous linguists wrote a couple of books (Labov 1972; Chomsky 1957).

## References

Chomsky, Noam (1957). *Syntactic Structures*. The Hague: Mouton.  
Labov, William (1972). *Sociolinguistic Patterns*. Philadelphia: University of Pennsylvania Press.



# Author/Year Style

This is in the .bib file

```
\begin{filecontents}{\jobname.bib}
@book{Labov1972,
  Address = {Philadelphia},
  Author = {William Labov},
  Publisher = {University of Pennsylvania Press},
  Title = {Sociolinguistic Patterns},
  Year = {1972}}

@book{Chomsky1957,
  Address = {The Hague},
  Author = {Noam Chomsky},
  Publisher = {Mouton},
  Title = {Syntactic Structures},
  Year = {1957}}
}
\end{filecontents}
```

This is in the main.tex document

```
\documentclass{article}
\usepackage[style=authoryear]{biblatex}
\addbibresource{\jobname.bib}
\begin{document}
Some famous linguists wrote a couple of books \autocite{Labov1972,Chomsky1957}
\printbibliography
\end{document}
```



# Thank you!

Some of the content in the slides are taken from Overleaf tutorial, Stackexchange and [cs.helsinki.fi](http://cs.helsinki.fi)