An Introduction to LaTeX and Overleaf

Francis Nguyen

Dr. Hoffman's Lab

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What is LATEX?

LATEX is a typesetting language that lets you typeset documents.
You can use it for:

- Homework
- Your thesis
- Your CV
- Meeting minutes
- Presentations like this one!

Why use LATEX?

- Beautiful typesetting %

Note

Completely customizable, with a variety of styles and colour palettes to choose from. Most importantly, in LaTeX you set **rules for the typesetter to follow**, and let it figure out the rest.

Why use LaTeX?

- Beautiful typesetting %
- Completely free!

Note

Of course, the most important point for cash-strapped grad students :P

Why use LaTeX?

- Beautiful typesetting %
- Completely free!
- .tex files easy to edit with any text editor

Note

This is particularly important when trying to edit things collaboratively. If you're familiar with source control, it becomes easy to track your manuscript alongside your code.

Why use LATEX?

- Beautiful typesetting %
- Completely free!
- .tex files easy to edit with any text editor
- Lets you focus on content

Note

The clear separation of content from formatting allows you to focus on content first, and adjust formatting as you like.

Why use LATEX?

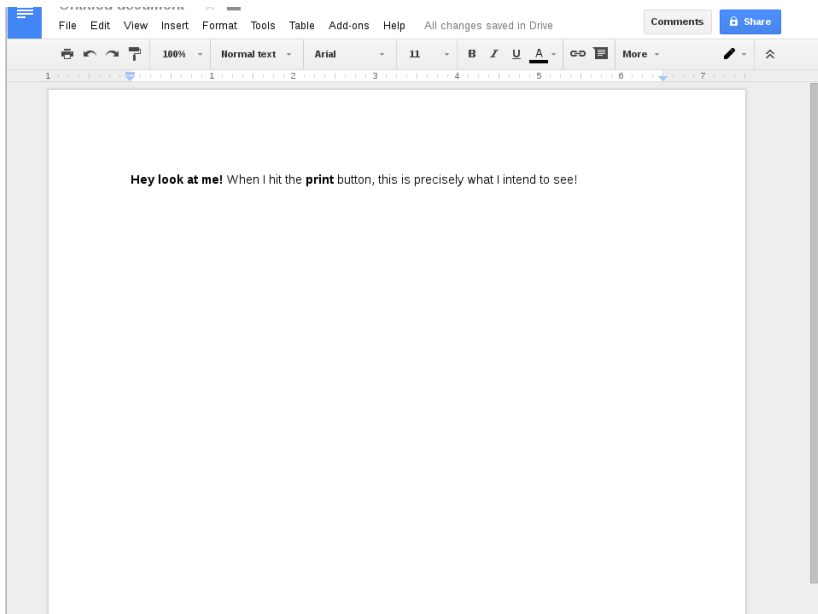- Beautiful typesetting %
- Completely free!
- .tex files easy to edit with any text editor
- Lets you focus on content
- Readable Mathematics

Note

We'll get to this one later, but let me just say this looks beautiful:

$$\begin{bmatrix} x_{11} & x_{12} & x_{13} & \dots & x_{1n} \\ x_{21} & x_{22} & x_{23} & \dots & x_{2n} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ x_{d1} & x_{d2} & x_{d3} & \dots & x_{dn} \end{bmatrix}$$

LATEX is not WYSIWYG

What does LATEX look like?

```
\section{Introduction}

\begin{frame}{Why use \LaTeX?}

\begin{itemize}
  \item<1-> Beautiful typesetting
  % --snip--
\end{itemize}

\vskip 1cm

\begin{block}{Note}
  \only<1>{Completely customizable...}
  % --snip--
\end{block}
```

Wait, I'm going to have to learn an entire language? What's the point?

Let me know if you've ever run into the following:

- You've finished a document including all of your citations. At the last moment, you realize you've been citing things in the wrong format! When you try to hastily apply a fix, all of your figures, etc. have weird spaces around them, which you have to manually fix.

Wait, I'm going to have to learn an entire language? What's the point?

Let me know if you've ever run into the following:

- You have a section of your paper that you aren't certain is going to make it into the final draft. There's no convenient way to hide an entire section, so you have to keep it in your document with the comment "Might be removed" in every revision. When it comes time to trim some content to meet the word limit, you realize that all of the content after your temporary section gets messed up.

Wait, I'm going to have to learn an entire language? What's the point?

Let me know if you've ever run into the following:

- Your collaborator reviews a document you wrote, and tells you they made some edits. It is really difficult to tell at a glance where all their changes are in a 20+ page document, and they seem to have disabled revision tracking before sending it back to you.

Good news!

LaTeX is the solution for all of these scenarios!

- The rules-based approach to typesetting means that LaTeX tries its best to take anything you throw at it
- You can really easily hide or reveal sections of a document via "commenting"
- Revision tracking is a lot easier to LaTeX than in any other format, because in the end you're working with text files. This makes it easy to integrate with revision tracking software like git

Tables and Figures

(This slide is part of the template given by Overleaf)

- Use `tabular` for basic tables — see Table 1, for example.
- You can upload a figure (JPEG, PNG or PDF) using the files menu.
- To include it in your document, use the `includegraphics` command (see the comment below in the source code).

Item	Quantity
Widgets	42
Gadgets	13

Table 1: An example table.

Readable Mathematics

(This slide is part of the template given by Overleaf)

Let $X_1, X_2, \ldots, X_n$ be a sequence of independent and identically distributed random variables with $E[X_i] = \mu$ and $\text{Var}[X_i] = \sigma^2 < \infty$, and let

$$S_n = \frac{X_1 + X_2 + \cdots + X_n}{n} = \frac{1}{n} \sum_i^n X_i$$

denote their mean. Then as n approaches infinity, the random variables $\sqrt{n}(S_n - \mu)$ converge in distribution to a normal $\mathcal{N}(0, \sigma^2)$.

LaTeX Cheat Sheet

LATEX 2_ε Cheat Sheet

Document classes

book	Default is two-sided.
report	No \part divisions.
article	No \part or \chapter divisions.
letter	Letter (?).
slides	Large sans-serif font.

Used at the very beginning of a document:
\documentclass{class}. Use \begin{document} to start contents and \end{document} to end the document.

Common documentclass options

10pt/11pt/12pt	Font size.
letterpaper/a4paper	Paper size.
twocolumn	Use two columns.
twoside	Set margins for two-sided.
landscape	Landscape orientation. Must use dvips -t landscape.
draft	Double-space lines.

Usage: \documentclass[opt,opt]{class}.

Packages

fullpage	Use 1 inch margins.
anysize	Set margins with \marginsize{l}{r}{t}{b}.
multicol	Use n columns with \begin{multicols}{n}.
latexsym	Use LATEX symbol font.

Use before \begin{document}. Usage: \usepackage{package}

Title

\author{text}	Author of document.
\title{text}	Title of document.
\date{text}	Date.

These commands go before \begin{document}. The declaration \maketitle goes at the top of the document.

Miscellaneous

\pagestyle{empty} Empty header, footer and no page numbers.

Document structure

\part{title}	\subsubsection{title}
\chapter{title}	\paragraph{title}
\section{title}	\subparagraph{title}
\subsection{title}	

Section commands can be followed with an * like \section*{title}, to supress heading numbers.
\setcounter{secnumdepth}{x} supresses heading numbers of depth > x, where chapter has depth 0.

Text environments

\begin{comment}	Comment block (not printed).
\begin{quote}	Indented quotation block.
\begin{quotation}	Like quote with indented paragraphs.
\begin{verse}	Quotation block for verse.

Lists

\begin{enumerate}	Numbered list.
\begin{itemize}	Bulletted list.
\begin{description}	Description list.
\item text	Add an item.
\item[x] text	Use x instead of normal bullet or number. Required for descriptions.

References

\label{marker}	Set a marker for cross-reference, often of the form \label{sec:item}.
\ref{marker}	Give section/body number of marker.
\pageref{marker}	Give page number of marker.
\footnote{text}	Print footnote at bottom of page.

Floating bodies

\begin{table}[place]	Add numbered table.
\begin{figure}[place]	Add numbered figure.
\begin{equation}[place]	Add numbered equation.
\caption{text}	Caption for the body.

The place is a list valid placements for body. t=top, h=here, b=bottom, p=separate page. !=place even if ugly. Captions and label markers should be within the environment.

Text properties

Font face

Command	Declaration	Effect
\textrm{text}	{\rm text}	Roman family
\textsf{text}	{\sf text}	Sans serif family
\texttt{text}	{\tt text}	Typewriter family
\textmd{text}	{\md text}	Medium series
\textbf{text}	{\bf text}	**Bold series**
\textup{text}	{\up text}	Upright shape
\textit{text}	{\it text}	*Italic shape*
\textsl{text}	{\sl text}	*Slanted shape*
\textsc{text}	{\sc text}	SMALL CAPS SHAPE
\emph{text}	{\em text}	*Emphasized*
\textnormal{text}	{\normalfont text}	Document font
\underline{text}		Underline

The command {\tt form} handles spacing better than the declaration {\tt form}.

Font size

\tiny	tiny	
\scriptsize	scriptsize	
\footnotesize	footnotesize	
\small	small	\Large Large
\normalsize	normalsize	\LARGE LARGE
\large	large	\huge huge
		\Huge Huge

These are declarations and should be used in the form {\small ...} or without braces to affect the entire document.

Verbatim text

\begin{verbatim}	Verbatim environment.
\begin{verbatim*}	Spaces are shown as ⌴
\verb!text!	Text between the delimiting characters (in this case !) is verbatim.

Justification

Environment	Declaration
\begin{center}	\centering
\begin{flushleft}	\raggedright
\begin{flushright}	\raggedleft

Miscellaneous

\linespread{x} changes the line spacing by the multiplier x.

Text-mode symbols

Symbols

&	\&	_	\.	...	\ldots	•	\textbullet
$	\$	\-	\{	#		\	\textbackslash
%	\%	\}	\{	#	\#			\textbar

Accents

ò	\'o	ó	\'o	ô	\^o	õ	\~o	ō	\=o
ȯ	\.o	ö	\"o	ç	\c c	ő	\v o	ŏ	\H o
ç	\c c	ǒ	\v o	ō	\b o	ọ	\d o	oo	\oo
Œ	\OE	œ	\oe	Æ	\AE	å	\aa	Å	\AA
ø	\o	Ø	\O	ł	\l	Ł	\L	ı	\i
ȷ	\j	¡	!'	¿	?'				

Delimiters

'	'	{	\{	[	[	<	\textless
'	'	}	\}	]	]	>	\textgreater

Dashes

Name	Source	Example	Usage
hyphen	-	X-ray	In words.
en-dash	--	1–5	Between numbers.
em-dash	---	Yes—or no?	Punctuation.

Line and page breaks

\\	Begin new line without new paragraph.
*	Prohibit pagebreak after linebreak.
\kill	Don't print current line.
\pagebreak	Start new page.
\neindent	Do not indent current line.

Miscellaneous

\today	March 3, 2005.
@\in@	Prints ~ instead of \'{}, which makes ~.
\	Space, disallow linebreak (W.J.~Clinton).
\@	Indicate that the . ends a sentence when following an uppercase letter.
\hspace{l}	Horizontal space of length l (Ex: l = 20pt).
\vspace{l}	Vertical space of length l.
\rule{w}{h}	Draw a line with width w and height h.

Learning LaTeX? Here's some links you may find helpful

Cheat sheet!
http://mrl.nyu.edu/~weishao/resource/LaTeX-Cheat-Sheet.pdf
A step by step basic tutorial:
https://www.latex-tutorial.com/tutorials/
The Not So Short Introduction to LaTeX:
https://tobi.oetiker.ch/lshort/lshort.pdf
The Comprehensive TeXArchive Network (CTAN):
https://www.ctan.org

Mastering LATEX? Here's some links you may find helpful

Best practices in LATEX
https://ch.tudelft.nl/sites/default/files/d.i.n.s.
dag_lecture_latex_by_wikash_sewlal.pdf The Not So Short
Introduction to LATEX:
https://tobi.oetiker.ch/lshort/lshort.pdf
The Comprehensive TEXArchive Network (CTAN):
https://www.ctan.org