



★ An Introduction to L^AT_EX & Overleaf ★



Stephen Hall
Computer Science & Engineering Librarian





What is L^AT_EX?

- Language system for document preparation/typesetting
 - Less like a programming language (Python, Java)
 - More like a markup language (HTML, XML)
- Primarily used for scholarly publications
 - Useful for formatting complex character strings
 - Multilingual letters, math formulae, etc.
- Documents are built on plaintext and formatted using commands
 - Similar to HTML tags – `<i>`, `<h1>`, `<p>`
 - Separates presentation from content
 - Different than a WYSIWYG editor like Word
- Open source and free to use
 - Supported by The L^AT_EX Project





What is L^AT_EX?

L^AT_EX is what
you use to make
documents look
this this...

2.5 How to add Lists

You can make lists with automatic numbering ...

1. Like this,
2. and like this.

...or bullet points ...

- Like this,
- and like this.

2.6 How to write Mathematics

L^AT_EX is great at typesetting mathematics. Let X_1, X_2, \dots, 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

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

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

2.7 How to change the margins and paper size

Usually the template you're using will have the page margins and paper size set correctly for that use-case. For example, if you're using a journal article template provided by the journal publisher, that template will be formatted according to their requirements. In these cases, it's best not to alter the margins directly.

If however you're using a more general template, such as this one, and would like to alter the margins, a common way to do so is via the geometry package. You can find the geometry package loaded in the preamble at the top of this example file, and if you'd like to learn more about how to adjust the settings, please visit this help article on [page size and margins](#).





Basics



$\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ formatting is done using commands.
Commands begin with a backslash and often
involve curly braces.





L^AT_EX Basics

Commands begin with a backslash, and typically involve curly braces.

This is some <code>\emph{italicized text}</code> .	This is some <i>italicized text</i> .
And here is some <code>\textbf{bold text}</code> .	And here is some bold text .
What about <code>\underline{underlined text}</code> ?	What about <u>underlined text</u> ?
Quotations use backticks on the left and apostrophes on the right (<code>`single quote'</code> or <code>``double quote''</code>).	Quotations use backticks on the left and apostrophes on the right (<code>`single quote'</code> or <code>“double quote”</code>).
<code>\begin{equation}</code> $a^2 + b^2 = c^2$ <code>\end{equation}</code>	$a^2 + b^2 = c^2$





L^AT_EX Basics

Commands begin with a backslash, and typically involve curly braces.

<code>\sqrt[3]{x + y}</code>	$\sqrt[3]{x + y}$
<code>\frac{5}{9}</code>	$\frac{5}{9}$
<code>\gamma \Gamma</code>	$\gamma \Gamma$
<code>\begin{bmatrix}</code> <code>10 & 20 & 30\\</code> <code>40 & 50 & 60\\</code> <code>\end{bmatrix}</code> <code>\]</code>	$\begin{bmatrix} 10 & 20 & 30 \\ 40 & 50 & 60 \end{bmatrix}$
<code>% This is a comment. It will not be read.</code> <code>This text is shown. % But not this text.</code>	This text is shown.





L^AT_EX Basics

```
\title{A Brief Examination of  
Why \emph{Battlestar Galactica}  
is the Best TV Show Ever}  
\author{Stephen Hall}  
\date{November 15, 2022}
```

```
\section{The Great Cylon War}  
\subsection{Kobol History}  
According to the Sacred Scrolls,  
man lived alongside the Gods in  
the birthplace place of humanity:  
the planet Kobol. In truth...
```

```
\includegraphics[]{}{BSGFleet.jpeg}
```

A Brief Examination of Why *Battlestar
Galactica* is the Best TV Show Ever

Stephen Hall

November 15, 2022

2 The Great Cylon War

2.1 Kobol History

According to the Sacred Scrolls, man lived alongside the Gods in the birthplace place of humanity: the planet Kobol. In truth, humanity lived alongside its creation, the Cylons, who, over time, evolved into humanoid form.

Though these humanoid Cylons were indistinguishable from their human creators, they were unable to procreate, instead relying on organic memory transfer to download their consciousness into new bodies after death.





Special Characters

%

Percent Sign

Begins a comment. Text following the % on the same line is not read.

&

Ampersand

Separates values in table/array environments.

~

Tilde

Used to create a non-breaking space (i.e. a space where a line break cannot be).

^

Caret

Denotes superscript. (e.g. $3^5 \rightarrow 3^5$)

_

Underscore

Denotes subscript. (e.g. $5_2 \rightarrow 5_2$)

\$

Dollar Sign

Identifies something as a mathematical expression. (e.g. the letter π vs. the number π)





Mathematical Expression Example

Let x and y be distinct,
positive integers, and let
 $z = x / y + 5$.

Let x and y be distinct,
positive integers, and let
 $z = x / y + 5$.

Let x and y be distinct, positive integers, and let $z = x / y + 5$.

Let x and y be distinct, positive integers, and let $z = x/y + 5$.





★	But what if you want to use these characters?	★
✦		✦
★		★



Escape Characters

An escape character lets $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ know that the following character is to be used literally.





Escape Characters

Results showed 78\% effectiveness.	Results showed 78% effectiveness.
Our budget was \\$2,000.	Our budget was \$2,000.
Lawyers from the firm Nelson \& Murdock argued the case.	Lawyers from the firm Nelson & Murdock argued the case.
The resulting value is then stored in the variable die_result.	The resulting value is then stored in the variable die_result.
Tweet us using the hashtag \#DankMemes.	Tweet us using the hashtag #DankMemes.





Inescapable Characters

Here is a tilde by itself: <code>\textasciitilde</code>	Here is a tilde by itself: ~
And a caret by itself: <code>\textasciicircum</code>	And a caret by itself: ^
And finally, the almighty backslash: <code>\textbackslash</code>	And finally, the almighty backslash: \

```
\begin{verbatim}
```

This is a block of verbatim text. `#$%^&*$\~`

```
\end{verbatim}
```

This is a block of regular text.

This is a block of verbatim text. `#$%^&*$\~`

This is a block of regular text.

Use the `\verb|``\usepackage{}` command to import
`\LaTeX` packages.

Use the `\usepackage{}` command to import `\LaTeX` packages.





	<h1>Environments</h1>	
---	-----------------------	---

Environments provide localized styling within `\begin{}` and `\end{}` tags.

```
\begin{environment}  
...  
...  
...  
\end{environment}
```





Commonly-Used Environments

Environments provide localized styling within `\begin{}` and `\end{}` tags.

<code>verbatim</code>	Prints text exactly, does not interpret characters as commands
<code>enumerate</code>	Creates numbered list (each entry begins with <code>\item</code>)
<code>itemize</code>	Creates bulleted list (each entry begins with <code>\item</code>)
<code>equation</code>	Interprets text as mathematical equation
<code>matrix</code>	Creates matrix (values separated by <code>&</code> , lines separated by <code>\\</code>) Environment wrapped in <code>\[</code> and <code>\]</code>
<code>tabular</code>	Creates table (values separated by <code>&</code> , lines separated by <code>\\</code>) Horizontal lines added with <code>\hline</code>
<code>thebibliography</code>	Creates bibliography (each entry begins with <code>\bibitem{id}</code>)





Special Characters

L^AT_EX can make just about any of them.

H\^otel	Hôtel
Na\"i ve	Naïve
\'El\`eve	Élève
Sm\o rrebr\o d	Smørrebrød
!`Se\~norita!	¡Señorita!
Sch\"onbrunner	Schönbrunner
Schlo\ss	Schloß





Non-Latin Characters

Writing in Arabic? L^AT_EX can handle that.

```
\newfontfamily\arabicfont[Script=Arabic,  
Scale=1.1]{Scheherazade}
```

For inline Arabic text, you can use the command `\verb|\textarabic:`

```
|\textarabic{السلام عليكم}
```

And for larger blocks of text you can use Arabic environment:

```
\begin{Arabic}
```

العربية لغة رسمية في كل دول الوطن العربي إضافة إلى كونها لغة رسمية في تشاد وإريتريا وإسرائيل. وهي إحدى اللغات الرسمية الست في منظمة الأمم المتحدة الصفحة إلى.

```
\end{Arabic}
```

For inline Arabic text, you can use the command `\textarabic:` السلام عليكم
And for larger blocks of text you can use Arabic environment:
العربية لغة رسمية في كل دول الوطن العربي إضافة إلى كونها لغة رسمية في تشاد وإريتريا وإسرائيل. وهي إحدى اللغات الرسمية الست في منظمة الأمم المتحدة الصفحة إلى.





Non-Latin Characters

How about Chinese? L^AT_EX can handle that, too.

```
\documentclass{ctexart}
\begin{document}
```

```
\section{前言}
\section{关于数学部分}
```

数学、中英文皆可以混排。You can intersperse math, Chinese and English (Latin script) without adding extra environments.

這是繁體中文

```
\end{document}
```

1 前言

1

1 前言

2 关于数学部分

数学、中英文皆可以混排。You can intersperse math, Chinese and English (Latin script) without adding extra environments.

這是繁體中文。





Want to make your own, custom commands?

Try out `\newcommand{}`!

$$(\circ \square \circ) \frown \perp \perp$$
$$\sim \backslash (\sim) / \sim$$



Example Document





```
\documentclass{article}
\title{Cool Title!}
\author{Stephen Hall}
\begin{document}
\maketitle % Displays header
\begin{abstract}
    Abstract text goes here.
\end{abstract}
\section{First Section}
Section text
\section{Second Section}
\subsection{First Subsection}
Subsection text\cite{identifier}
\subsection{Second Subsection}
Subsection text
\begin{thebibliography}{}
    \bibitem{identifier}
    Book info
\end{thebibliography}
\end{document}
```



Cool Title!

Stephen Hall
November 15, 2022

Abstract
Abstract text goes here.

1 First Section
Section text

2 Second Section

2.1 First Subsection
Subsection text[1]

2.2 Second Subsection
Subsection text

References
[1] Book info





What is Overleaf?

- Online environment for L^AT_EX editing
 - Free to use
 - In-browser, no download required
- Allows for multi-user collaboration
- Offers example L^AT_EX templates that can be modified
- Provides ample tutorials and instruction
- Lets users download source code and/or finished PDFs



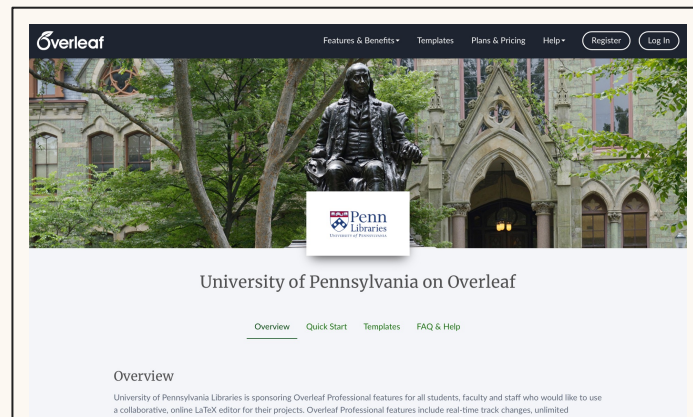


What is Overleaf?

Penn Premium Membership

<https://www.overleaf.com/edu/upenn>

Penn has a ready-made dissertation template for you to use!





What is Overleaf?

Let's try it out!

<https://tinyurl.com/upennlatex>

