

Preparing Research Papers Using L^AT_EX

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Motivation

Moving a picture in Microsoft Word



Other difficulties:

Table of contents, equations, tables, references, citations, fonts!!

Motivation

Writing a Paper/Thesis at University



- Figuring out Word
- Actually writing the thesis

In \LaTeX :

You take care of writing, and we will take care of presentation!!

Overview

- 1 Introduction
 - What is \LaTeX ?
 - \LaTeX Vs. MS Word
 - Why \LaTeX ?
- 2 Document Structure in \LaTeX
 - The Preamble
 - The Front Matter
 - The Body
 - The Back Matter
- 3 Getting Help and Learning More!!



What is \LaTeX ?

\LaTeX is ...

... a sophisticated document preparation system suitable for producing scientific and mathematical documents.

\LaTeX has

- Stylistic uniformity
- Bibliography support
- Reference tracking
- Sophisticated structuring abilities



What is \LaTeX ?

\LaTeX is not ...

... a word processor.

\LaTeX does not

- Give you complete control over formatting.
- Provide a graphical interface for editing.



\LaTeX Vs. WYSIWYG (MS Word)



\LaTeX



\LaTeX Vs. WYSIWYG (MS Word)

- 1 With a word processor, changing the formatting means you have to change each instance individually.
 - With \LaTeX , you just redefine the relevant commands.
- 2 With a word processor, you spend valuable time agonizing over what font size to make the section headings.
 - With \LaTeX , you just tell it to start a new section.
- 3 With a word processor, you have to carefully match any provided templates.
 - With \LaTeX , you can be sure you've fit the template, and switch templates easily.



Why \LaTeX ?

- 1 \LaTeX allows you to worry about the **content and the structure**, rather than the presentation.
- 2 \LaTeX enables authors to typeset and print their work at the **highest typographical quality**.
- 3 \LaTeX has one of the most advanced **math typesetting** systems around.
- 4 \LaTeX keeps **track of references** so you don't have to.
- 5 \LaTeX allows you to make more **consistent**, and more easily changeable, documents (Professionally crafted **predefined Layouts**).



Document Class

\LaTeX has several templates, selected using `\documentclass`

- report (Large organized document– Thesis).
- article (Ordinary document– Paper).
- book (Chapters).
- letter/CV.
- beamer (Presentation).
- Many new class files can be created modifying the above 4 base class files (Ex. IEEEtran.cls- derived from article.cls).



L^AT_EX | Basic Document Structure

Example.tex

```
\documentclass{article}
\usepackage[utf8]{inputenc}

\title{LaTeX example}
\author{Philippe Fournier-Viger}
\date{February 2017}

\begin{document}

\maketitle

\section{Introduction}
This is my introduction

\section{Conclusion}
This is the conclusion

\end{document}
```

LaTeX



Example.pdf

LaTeX example

Philippe Fournier-Viger

February 2017

1 Introduction

This is my introduction

2 Conclusion

This is the conclusion

The format of a document is a pretty simple.

In the Preamble

- Documentclass (article, book, thesis, ...).
- Packages (color, graphicx, setspace, geometry, harvard ...).

In the Front Matter

- Title/Author.
- Abstract.

In the Body

- Contents (Sections, Subsections, Subsubsections).

In the Back Matter

- Bibliography.

L^AT_EX | Basic Document Structure

- 1 Define the types of the document (article, book, thesis, ...).

```
\documentclass [12pt]{article}
```

- 2 Preamble. Incorporate packages or define macros here..

```
\usepackage {color}  
\usepackage {graphicx}
```

- 3 Main body (stuff to be printed, title, authors, abstract, sections, references, ...).

```
\begin{document}  
...  
\end{document}
```



L^AT_EX | Basic Document Structure

In the Preamble

You specify your document class.

- Document classes: letter, article, report, book, beamer, ...).

```
\documentclass[12pt]{article}
```

- Packages: numerous packages are available.

```
\usepackage[margin=1in]{geometry}
```

```
\usepackage{setspace}
```

```
\usepackage{harvard}
```



L^AT_EX | Basic Document Structure

In the Front Matter

- `\begin{document}`
- `\title{}`
- `\author{}`
- `\maketitle`
- `\begin{abstract}`
- `\end{abstract}`
- `\pagebreak`



L^AT_EX | Basic Document Structure

In the Body

To begin a new section

- `\section{}`
- Similarly, `\subsection{}`, `\subsubsection{}`
- L^AT_EX does automatic numbering.
- `\emph{}`
- `\textbf{}`
- `\textit{}`
- `\singlespacing`, `\doublespacing`
- `\onehalfspacing`, `\centering`



L^AT_EX | Basic Document Structure

sequence (in any order). Formally, we say that a rule $I_a \Rightarrow I_b$ occurs in a sequence $s = \langle I_1, I_2, \dots, I_n \rangle$ if and only if there exists an integer k such that $1 \leq k < n$, $I_a \subseteq \bigcup_{i=1}^k I_i$ and $I_b \subseteq \bigcup_{i=k+1}^n I_i$.

same sequence (in any order). Formally, we say that a rule $I_a \Rightarrow I_b$ occurs in a sequence $s = \langle I_1, I_2, \dots, I_n \rangle$ if and only if there exists an integer k such that $1 \leq k < n$, $I_a \subseteq \bigcup_{i=1}^k I_i$ and $I_b \subseteq \bigcup_{i=k+1}^n I_i$.



L^AT_EX | Basic Document Structure

Word

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Latex

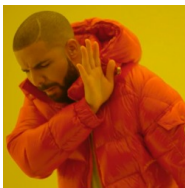
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L^AT_EX | Basic Document Structure

Mathematical Equations

- Math always in between $\$$.
- Alternatively,
`\begin{equation}`
`\end{equation}`.
- $\$1+4=5\$$.
- `\frac{}{}`
- `\sqrt{}`
- `\sum_{k=1}^n`
- `^{} , _{}`
- Greek letters e.g. `\alpha`.



Making
Math equations
in MS Word



Making
Math equations
in Latex

L^AT_EX | Basic Document Structure

Figures

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

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

- Multiple figures can be inserted using `\subfigure`.



L^AT_EX | Basic Document Structure

Cross Referencing

- L^AT_EX generates numbers for Theorem, Equation, Section, Figure and other environments automatically.
- You can access them with `\label` and `\ref`.
- For example:

```
\section{Introduction} \label{sec:intro}
```

→ In Section `\ref{sec:intro}`, we



L^AT_EX | Basic Document Structure

Citations

- `\cite{bibtexkey}`
- It is more convenient to create a bibliography file, called bibtex file(.bib) and use it as needed.
- Bibliography information is stored in a *.bib file, in Bibtex format.
- `\usepackage{chicago}`
- `\bibliographystyle{chicago}`
- `\bibliography{bibfile}`



L^AT_EX | Basic Document Structure

Citations

- In the *.bib file:

```
@article{issa2019improved,  
title={Improved event-triggered adaptive control of non-linear  
uncertain networked systems},  
author={Issa, Sami Al and Chakravarty, Arghya and Kar, Indrani},  
journal={IET Control Theory & Applications},  
volume={13},  
number={13},  
pages={2146--2152},  
year={2019},  
publisher={Wiley Online Library}  
}
```

- How to cite Citing references in text:

`\cite{cuc98}` = (Cuce 1998)

`\citeN{cru98}` = Crud (1998)

`\shortcite{tom98}` = (Tom, et. al. 1998).



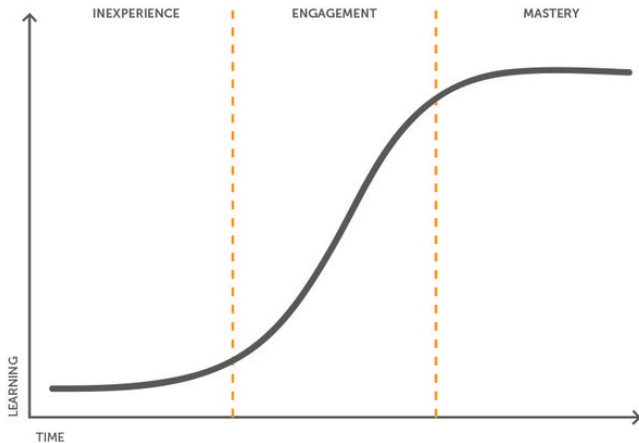
L^AT_EX | Basic Document Structure

In the Back Matter

- Do not forget `bibliographyfilename`
- Make sure that the `bibtex` file is saved in the same location where the main `tex` file is saved.
- Do not forget `\end{document}`.



Learning curve



Getting started

Installing L^AT_EX

- 1 MiKTeX
 - MiKTeX is a typesetting system for the Windows.
 - It is generally recommended to install MiKTeX first, then TeXstudio.
- 2 Text editor (TeXstudio is recommended).
 - TeXstudio creates the source file (.tex and others).
- 3 Packages



How to Use \LaTeX to Create Documents

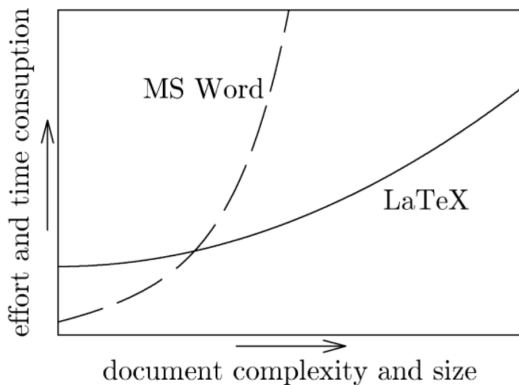
- Start with a skeleton document (create it by yourself, get it from you classmates, download it from journals' website).
- Fill stuff (text, formula, figure, table . . .) into your skeleton document.
- Run LaTeX to generate output and make modifications.
- **Learn as you go!!**

Process to Create a Document using \LaTeX

Tex input file ([main.tex](#))
→ Run program
→ Output file ([main.pdf](#))



Tips



Tips

- **Overleaf**: Online L^AT_EX editor (VPN is required!!)
- **To do...**
 - 1 Install all the necessary tools
 - 2 Try to write your first LaTeX doc
 - 3 How to create a list? How to create numbered list?
 - 4 How to add a table?
 - 5 How to organize the doc over several files (e.g. one file per chapter/section)?



Getting Help and Learning More!!

- ATEX Wikibooks: en.wikibooks.org/wiki/LaTeX
- The Not So Short Introduction to L^AT_EX 2 ϵ :
www.ctan.org/tex-archive/info/lshort/english/lshort.pdf
- A Short Math Guide for L^AT_EX:
<http://tug.ctan.org/info/short-math-guide/short-math-guide.pdf>
- The Beamer Theme Matrix:
www.hartwork.org/beamer-theme-matrix/
- **Google is still your best friend!**



References

- Introduction to L^AT_EX, writing papers the right way, Research Science Institute, MIT.
<https://web.mit.edu/rsi/www/pdfs/new-latex.pdf>.
- Marco D. Santambrogio, A short introduction to LaTeX, Politecnico di Milano.



Thank You شُكراً لكم

