

Introduction to L^AT_EX

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Overview

1 Introduction

2 LaTeX

- Syntax
- Structure
- Floats

3 BibTeX

4 Compilation

Introduction

Experience

What is your experience with \LaTeX ?

Expectations

What do you hope to get out of these lectures?

Planning

- Today: Lecture on \LaTeX
- Monday 15 September: Philosophy of Science II
- Friday 19 September: Experimental Designs I
- Monday 22 September: Interactive hands-on \LaTeX
- ...: rest of course

What is LaTeX?

\LaTeX is a document preparation system that allows authors to typeset and print documents using a predefined, professional layout.

Example

Example (Document structure)

```
\documentclass{article}
\title{Introduction to \LaTeX}
\author{Jordi Bieger}
\date{12 September 2014}
\begin{document}
  \maketitle
  \emph{Lorem} ipsum dolor sit amet.
\end{document}
```

Features

- Typesetting: kerning and ligatures
- Free, portable, extensible
- Plain text + commands (no WYSIWYG)
- Separation of style and content
- Easy style changes with templates
- Math and references support
- Used or required by many academic journals and conferences

History

TeX

- 1 Typesetting text and mathematical formulae
- 2 Donald Knuth
- 3 1978
- 4 τεχνική



LaTeX

- 1 Provides functionality on top of TeX to let authors easily use a predefined, professional layout
- 2 Leslie Lamport
- 3 LaTeX: 1984
- 4 LaTeX 2_ε: 1994



Commands

\LaTeX = plain text + commands

Command

`\commandname[option1,option2,...]{argument1}{argument2}...`

Groups and switches

Switches are **commands** that apply to the rest of the **group**.

Compare

```
{\em This text will be emphasized.}
```

```
\emph{This text will be emphasized.}
```

Environments

For changes to a larger block of text **environments** can be defined.
They act like groups and can take arguments.

Environment

```
\begin{center}
```

This text will be centered.

```
\end{center}
```

Whitespace

Input	Output
<code><space>+</code>	<code><space></code>
<code><tab>+</code>	<code><space></code>
<code><linebreak></code>	<code><space></code>
<code><linebreak><linebreak>+</code>	<code><linebreak></code>
<code>\\</code>	<code><linebreak></code>
<code>\LaTeX pert</code>	<code>ℒ_AT_EX pert</code>
<code>\LaTeX{} user</code>	<code>ℒ_AT_EX user</code>
<code>\LaTeX\ user</code>	<code>ℒ_AT_EX user</code>

Table: Whitespace treatment in \LaTeX

Special characters

Special characters

\$ % ^ & _ { } ~ \

\# \\$ \% \^{} \& _ \{ \} \~{} \textbackslash{}

<http://ctan.uib.no/info/symbols/comprehensive/symbols-a4.pdf>

Comments

Example (Comments)

```
This will be printed. % This won't be.
```

Example (Comment environment)

```
\usepackage{verbatim} % in the preamble  
This will  
\begin{comment}  
not  
\end{comment}  
be printed.
```

Document structure

Example (Document structure)

```
% begin preamble
\documentclass{article}

\usepackage{amsmath}
\usepackage{graphicx}

% maybe (re)define commands

% end preamble

\begin{document}
\title{Introduction to \LaTeX}
\author{Jordi Bieger}
\date{12 September 2014}
\maketitle

\emph{Lorem} ipsum dolor sit amet.
\end{document}
```

Preamble - Document class

```
\documentclass[11pt,twoside,a4paper]{article}
```

class	description
article	scientific articles
IEEEtran	IEEE Transactions
minimal	minimal format for debugging
report	long reports
book	complete books
beamer	presentations
???	often you'll be told

Table: built-in document classes

Preamble - Packages

`\usepackage[options]{package}`

or

`\usepackage{package1,package2,package3}`

Preamble - Useful packages

package	description
<code>\usepackage[T1]{fontenc}</code>	allows copy-pasting of UTF-8 characters
<code>\usepackage{lmodern}</code>	modern fonts
<code>\usepackage[utf8]{inputenc}</code>	directly type UTF-8
<code>\usepackage{mathtools}</code>	math
<code>\usepackage{graphicx}</code>	figures
<code>\usepackage{subfig}</code>	subfigures
<code>\usepackage{float}</code>	figure and table placement

Table: see also <http://www.ctan.org/>

Document - Top matter

Example (Top matter)

```
\title{Introduction to \LaTeX}  
\author{Jordi Bieger \and Kristinn R. Þórisson}  
\thanks{Reykjavik University}}  
\date{\today}  
\maketitle
```

You can also use the `titlepage` environment and/or the `titling` package for more detailed formatting control.

Document - Abstract

Example (Abstract)

```
% Change the "name" of the abstract:  
\renewcommand{\abstractname}{Summary}  
\begin{abstract}  
Your abstract here.  
\end{abstract}
```

Document - Sections

type	level
<code>\part</code>	-1
<code>\chapter</code>	0
<code>\section</code>	1
<code>\subsection</code>	2
<code>\subsubsection</code>	3
<code>\paragraph</code>	4
<code>\subparagraph</code>	5

Document - Sections

Example (Sections)

```
% only number sections and larger:
\setcounter{secnumdepth}{1}
% numbered and in TOC:
\section[TOC Name]{Name in text}
% not numbered:
\section*{Name in text}
% add to TOC anyway:
\addcontentsline{toc}{section}{TOC Name}
```

Document - Table of contents

Example (Table of contents)

```
% only omit (sub)paragraphs:  
\setcounter{tocdepth}{3}  
% show TOC:  
\tableofcontents
```

Document - References

Example (Labeling)

```
\section{Results}  
\label{sec:results}
```

Example (Referencing)

```
\section{Introduction}  
Results will be discussed in Section~\ref{sec:results}.
```


Figures

Example (Figure)

```
\begin{figure}[h!] % htbp or H with the float package
\includegraphics[width=.5\columnwidth]{file}
\caption{Caption goes here.}
\label{fig:myfigure}
\end{figure}
```

Tables

Example (Table)

```
\begin{table}
\begin{tabular}{l | c c | r}
\toprule
A & B & C & D \\
\midrule
a & b & c & d \\
aa & bb & cc & dd \\
\bottomrule
\end{tabular}
\caption{caption}
\label{tbl:mytable}
\end{table}
```

Tables - Column alignment

spec	description
<code>l</code>	left align
<code>c</code>	center align
<code>r</code>	right align
<code>p{width}</code>	wrap + top align
<code>m{width}</code>	wrap + middle align
<code>b{width}</code>	wrap + bottom align
<code> </code>	vertical line
<code> </code>	double vertical line

Table: Column alignment specification

Tables - Inside

command	description
<code>&</code>	new column
<code>\\</code>	new row
<code>\hline</code>	horizontal line
<code>\toprule</code>	top border
<code>\midrule</code>	middle separator
<code>\bottomrule</code>	bottom border
<code>\newline</code>	new line

Table: Table commands. `\toprule`, `\midrule` and `\bottomrule` require the `booktabs` package.

Math

You need to explicitly enter math mode to print mathematical formulae.

Use escaped parentheses `\()` to display math inline like $\sum_{i=0}^{\infty} 2^{-i} = 2$ in this sentence.

Use escaped brackets `\[]` to display math in a separate unnumbered block like this:

$$\sum_{i=0}^{\infty} 2^{-i} = 2$$

Use the equation environment to display math in a numbered block that you can refer to like Equation 1:

$$\sum_{i=0}^{\infty} 2^{-i} = 2 \tag{1}$$

Math - Examples

input	output
<code>w_j^{i+1}</code>	w_j^{i+1}
<code>\left(\frac{1}{2}\right)</code>	$\left(\frac{1}{2}\right)$
<code>\cos(2\pi)</code>	$\cos(2\pi)$

Table: see also

<http://www.artofproblemsolving.com/Wiki/index.php/LaTeX:Symbols>

BibTeX

Example (references.bib)

```
@inproceedings{thorisson_constructionist_2009,  
  title = {From Constructionist to Constructivist {AI}},  
  url = {http://www.aaai.org/ocs/index.php/FSS/FSS09/paper/download/888/1320},  
  urldate = {2013-12-18},  
  booktitle = {{AAAI} Fall Symposium Series: Biologically Inspired Cognitive Architectures},  
  publisher = {{AAAI} press},  
  author = {Th\`{o}risson, Kristinn R.},  
  year = {2009},  
  keywords = {{AGI}, constructionist, constructivist},  
  pages = {175-183}  
},
```

Bibliography

Example (article.tex)

```
% choose style: abbrv, acm, alpha,  
% apalike, ieetr, plain, siam or unsrt  
\bibliographystyle{plain}  
\bibliography{references}  
  
\end{document}
```

The `natbib` package gives more options.

Citation

Example (article.tex)

```
\citet*{thorisson_constructionist_2009}  
talk about  
AI~\citep{thorisson_constructionist_2009}.
```

Compilation

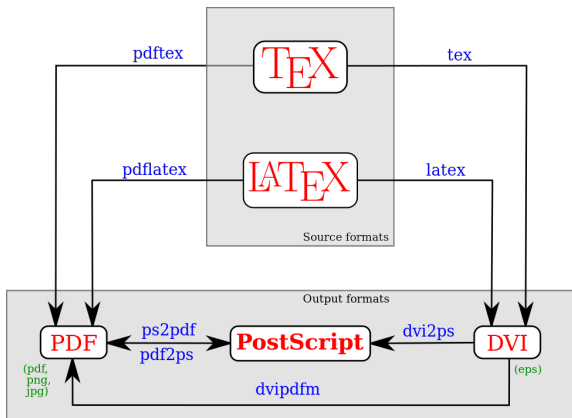


Figure: from <http://en.wikibooks.org/wiki/LaTeX/Basics>

Compilation - Commands

Example (command line)

```
pdflatex filename % see what you cited  
bibtex filename % extract relevant citations  
pdflatex filename % inject this information  
pdflatex filename % fix all references
```