

Scientific Writing using L^AT_EX

CEPLAS Grad School Classes

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Düsseldorf, 18-19-20.V.2016

What is L^AT_EX?

*TeX is a low-level markup and programming language created by Donald Knuth to typeset documents **attractively** and **consistently***^[1]

L^ATeX is a macro package based on TeX created by Leslie Lamport. Its purpose is to simplify TeX typesetting^[1]

^[1]<https://en.wikibooks.org/wiki/LaTeX/Introduction>

Why L^AT_EX?

1. You are **forced** to structure your documents correctly
2. Indexes, footnotes, citations and references are generated, maintained, updated **automatically**
3. Once you define the document style, maintaining the layout (fonts, text sizes, line heights, tables, bibliography etc.) **consistent** is not your problem anymore

... using L^AT_EX is an investment!

^[1]<https://en.wikibooks.org/wiki/LaTeX/Introduction>

OK, let's get started with L^AT_EX!

Welcome to WYSIWYM

Scientific Writing
using \LaTeX

Dr Antonella
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Day One: getting
started with \LaTeX

What *You* See Is What YOU Mean

Welcome to WYSIWYM

What *You* See is What YOU Mean

... please go to the classes page

`https://wiki.hhu.de/display/QTBP/Scientific+
Writing+with+LaTeX`

and download the file `day1.tex`

Commands

```
\command[option1, option2]{argument1}{argument2}
```

\command is different from \Command!

commands can also have no options and no arguments

Special characters

Character	Type	Reserved for
#	<code>\#</code>	arguments
\$	<code>\\$</code>	math
%	<code>\%</code>	comment
&	<code>\&</code>	tab delimiter
\	<code>\textbackslash{}</code>	commands
^	<code>\textasciicircum{}</code>	math
-	<code>\-</code>	math
{	<code>\{</code>	arguments
}	<code>\}</code>	arguments
~	<code>\textasciitilde{}</code>	spacing
>	<code>\textgreater</code>	T1 font encoding
<	<code>\textless</code>	T1 font encoding

Spacing & linebreak 1

In L^AT_EX you will never introduce double spaces unintentionally, same for linebreaks

```
In
\LaTeX
you will
never introduce
double      spaces
unintentionally,
same
for
linebreaks
```

Spacing & linebreak 2

To break a line you can use
or
or you can leave an empty line
like this

```
To break a line you can use\\  
or \newline  
or you can leave an empty line  
  
like this\\[2ex]
```

The empty line in documents will actually start a new paragraph and this kind of gives a direction on how to structure your text:

do not overbreak thoughts!

Spacing & linebreak 3

I'll put two spaces
now three spaces
also three spaces, but these are unbreakable
now I put arbitrary space

now I fill till the end of line
now I fill till the end of line
now I fill till the end of line

can fill vertical space too

Spacing & linebreak 4

```
I'll put two\ \ spaces\\  
now three\ \ \ spaces\\  
also three~~~spaces, but these are unbreakable\\  
now I put arbitrary\hspace{2cm}space\\[2ex]  
now I fill till the end of\hfill line\\  
now I fill till the end\hfill of line\\  
now I fill till the\hfill end of line
```

```
\vfill
```

```
can fill vertical space too
```

A key concept in L^AT_EX

```
\begin{center}  
  Centered text  
\end{center}
```

is the same as

```
{\centering  
  Centered text  
}
```

Document structure

```
\documentclass{...}  
  
%this is the preamble  
  
\begin{document}  
%here goes your content  
  
\end{document}
```

```
\documentclass[option1,option2,...]{class}
```

Classes: article, book, report, letter, beamer, ...

Options: 10pt, 11pt, 12pt, a4paper, openright, twocolumn,
twoside, ...

The preamble

Here you can declare the packages needed, set styles, or even define your own commands

```
\usepackage[option1, option2, ...]{package}
```

Some useful packages are

```
\usepackage[english]{babel}  
\usepackage[utf8]{inputenc}  
\usepackage{graphicx}  
\usepackage{multirow,bigdelim}  
\usepackage[hdivide={2cm, *, 2cm}, vscale=0.85,  
  bindingoffset=1cm]{geometry}  
\usepackage{booktabs}
```


Article example

```
\documentclass[10pt]{article}
\usepackage{booktabs}
\usepackage[english]{babel}
\usepackage[utf8]{inputenc}
\usepackage{lipsum}%just for text generation
\usepackage{multirow}
\usepackage{graphicx}
\author{Your Name}
\title{A first article with \LaTeX}
\begin{document}
\maketitle
\begin{abstract}
  \lipsum[1]
\end{abstract}
\section{Introduction}\label{sec:intro}
  \lipsum[2-3]
\end{document}
```

Lists

- ▶ bullet list first item
 - ▶ bullet list second item
-
1. numbered list first item
 2. numbered list second item

```
\begin{itemize}
\item bullet list first item
\item bullet list second item
\end{itemize}

\begin{enumerate}
\item ordered list first item
\item ordered list second item
\end{enumerate}
```

Change bullet style

- + bullet list first item
 - bullet list second item
- bullet list first item
- bullet list second item
- * bullet list first item
- * bullet list second item
- \$ bullet list first item
- \$ bullet list second item

```
\begin{itemize}
\item[+] bullet list first item
\item[-] bullet list second item
\end{itemize}

\begin{enumerate}[-]
\item bullet list first item
\item bullet list second item
\end{enumerate}

\begin{enumerate}[*]
\item bullet list first item
\item bullet list second item
\end{enumerate}

\begin{enumerate}[\$]
\item bullet list first item
\item bullet list second item
\end{enumerate}
```

Change ordering label

- a) ordered list first item
- b) ordered list second item
- A- ordered list first item
- B- ordered list second item
- (i) ordered list first item
- (ii) ordered list second item
- (iii)
- (iv)
- (v) ...

```
\begin{enumerate}[a]  
\item ordered list first item  
\item ordered list second item  
\end{enumerate}  
  
\begin{enumerate}[-A-]  
\item ordered list first item  
\item ordered list second item  
\end{enumerate}  
  
\begin{enumerate}[(i)]  
\item ordered list first item  
\item ordered list second item  
\item  
\item  
\item \dots  
\end{enumerate}
```

Floating environments

```
\begin{floatenv}[placement specifier]  
...  
\end{floatenv}
```

specifier	meaning
h	float here, i.e., approximately at the same point it occurs in the source text (however, not exactly at the spot)
t	top of the page
b	bottom of the page
p	on a special page for floats only
!	Override internal parameters LaTeX uses for determining “good” float positions

Table : placement specifier parameters

. . . usually, so try to

- ▶ be careful with floats to text ratio
- ▶ use reasonable sized floats within the text
- ▶ consider devoting an appendix to large tables/pictures (yes, you can have many-pages-long tables; no, they do not look good in the middle of a chapter)
- ▶ use commands that “clean” the page to avoid figures going to other sections/chapters (e.g. `clearpage`)

Tables 1

```
\begin{table}[htb]\centering
\begin{tabular}{cp{.6\textwidth}}\toprule
specifier & meaning\\\midrule
h & float here, i.e., approximately at the same
    point it occurs in the source text (however, not
    exactly at the spot)\\
t & top of the page \\
b & bottom of the page \\
p & on a special page for floats only \\
! & Override internal parameters LaTeX uses for
    determining ‘good’ float positions\\
\bottomrule\end{tabular}\caption{placement
specifier parameters}\end{table}
```

Tables 2

	Col1	Col2	Col2
row1	left	right	center
row2	a	b	c
row3	d	e	f

Table : dummy table for example

```
\begin{table}[htb]\centering
\begin{tabular}{clrc}\toprule
& Col1 & Col2 & Col2 \\ \midrule
row1 & left & right & center \\
row2 & a & b & c \\
row3 & d & e & f \\
\bottomrule\end{tabular}\caption{dummy table for
example}\end{table}
```


Tables 3

	Col1	Col2	Col2
row1	0	0	0
row2	a	b	c
	a	b	c
row3	d	e	f
row4		g	
row5	h		
row6	j		i

```
\begin{tabular}{cccc}\toprule
& Col1 & Col2 & Col2 \\ \midrule
row1 & 0 & 0 & 0 \\ \midrule
\multirow{2}{*}{row2} & a & b & c \\
& a & b & c \\ \midrule
row3 & d & e & f \\ \midrule
row4 & \multicolumn{3}{c}{g} \\ \midrule
row5 & h & \multicolumn{2}{c}{\multirow
{2}{*}{i}} \\
row6 & j & & \\ \bottomrule\end{tabular}
```

Figures 1

```
\begin{figure}[htb]\begin{center}  
\includegraphics[width=0.8\textwidth]{LaTeX_diagram  
.png}  
\caption{From \url{https://en.wikibooks.org/wiki/  
LaTeX/}\label{figcompilation}}  
\end{center}\end{figure}
```

Figures 2

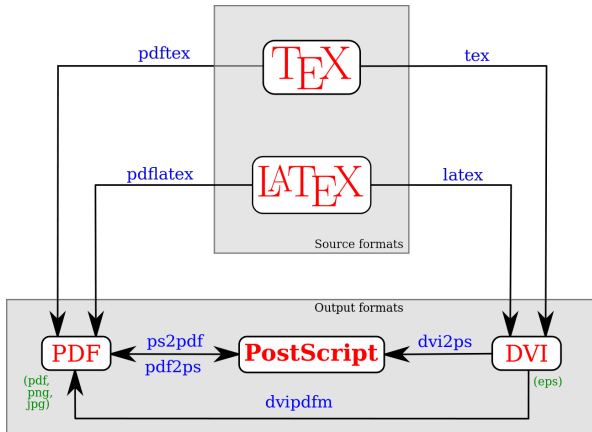


Figure : From <https://en.wikibooks.org/wiki/LaTeX/>

Subfigures 1

Needs the subfigure package

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started with \LaTeX

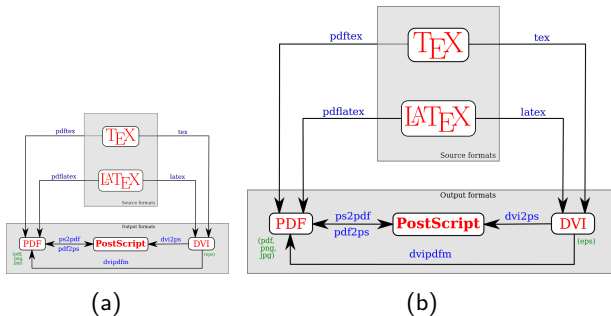


Figure : Dummy example, (a) is the same as (b) just smaller

Subfigures 2

Needs the subfigure package

```
\begin{figure}[htb]\begin{center}
\subfigure[]{\label{fig:a}
\includegraphics[width=0.3\textwidth]{LaTeX_diagram
.png}}
\subfigure[]{\label{fig:b}
\includegraphics[width=0.5\textwidth]{LaTeX_diagram
.png}}
\caption{Dummy example, (a) is the same as (b) just
smaller}
\end{center}\end{figure}
```

Exercise!

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