

# Introduction to L<sup>A</sup>T<sub>E</sub>X

## A Beginner's Guide

This is a simple guide that shall serve as an introduction to L<sup>A</sup>T<sub>E</sub>X ('l<sub>a</sub>:t<sub>e</sub>k or 'l<sub>e</sub>r<sub>t</sub>e<sub>k</sub>).  
Test paper.

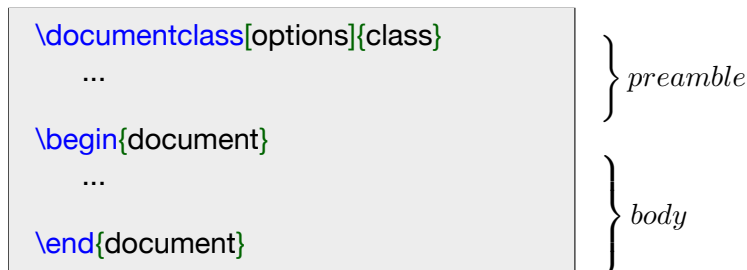
*\*Please note that ...*

### 1. What is L<sup>A</sup>T<sub>E</sub>X?

Add text here.

### 2. Structure of a L<sup>A</sup>T<sub>E</sub>X-Document

A L<sup>A</sup>T<sub>E</sub>X-document consists of two main parts: 1.) the preamble and 2.) the body. The preamble is where the fundamentals of the document are set up, including the type of document, format and packages (see XXX). It may also contain metadata such as the author, date or title. The preamble is initiated by the command `\documentclass{}` and ends with the beginning of the main body. The main body is where the actual text of the document is created through a combination of normal text and markup. It always begins with the `\begin{document}` command and ends with the `\end{document}` command. Every L<sup>A</sup>T<sub>E</sub>X document requires all three of the above command lines irregardless of the contents. Thus, the general structure of a L<sup>A</sup>T<sub>E</sub>X document is:



Ex. 1)

```
\documentclass{minimal}
\begin{document}
Hello world!
\end{document}
```

### 3. L<sup>A</sup>T<sub>E</sub>X-Syntax

In L<sup>A</sup>T<sub>E</sub>X special commands are used for typesetting a text or document. These commands are usually a combination of special characters and letters, do not allow

for any spaces and are case sensitive <sup>1</sup>. Similarly to the valency of a verb in language,  $\text{\LaTeX}$  commands can be classified by the number of arguments they take. In general, they can be categorised into two major groups:

- 1.) Zero-Argument-Commands
- 2.) Non-Zero-Argument-Commands

### 3.1 Zero-Argument-Commands

“Zero-Argument-Commands” are commands that do not require any additional arguments - at least on the surface level - and that can be used intransitively (i.e. on their own). These commands generally consist of three components: 1.) a backslash, 2.) a simple word or phrase indicating the function of the command and 3.) (empty) curly brackets. They can be notated as:

`\somecommand{}`

Ex. 1)

<code>\LaTeX{}</code>	–	displays the “LaTeX” symbol ( $\text{\LaTeX}$ )
<code>\noindent{}</code>	–	suppresses paragraph indentation
<code>\bigskip{}</code>	–	creates a vertical empty space

Since basic commands like this do not take on any specified arguments, the curly brackets (for more detail see 3.2) may be left out. While this normally does not entail any loss of function, it can lead to minor behavioural differences (such as inserting or deleting a space), especially when the command is a direct part of the text:

<code>\LaTeX is cool</code>	vs.	<code>\LaTeX{} is cool</code>
(= $\text{\LaTeX}$ is cool)		(= $\text{\LaTeX}$ is cool)

### 3.2 Commands and Arguments

“Non-Zero-Argument-Commands” are commands that typically require an argument, i.e. an object they can be applied to. For example, the `\textit{x}` command that is used for italicising needs an object *x* (usually a word or text) it can refer to or else it would not execute. This type of commands follows a similar syntax to the one seen in 3.1, with the exception that a.) curly brackets cannot be empty and actively require an argument and b.) facultative arguments (arguments that modify a command but are not required for the command to work) may be passed on via square brackets. Sometimes a command may also require more than one obligatory argument, which can be marked with additional curly brackets:

<sup>1</sup> Case sensitive means that upper- and lowercase are treated as distinct. For example, `command1` and `Command1` would be two different commands and not interchangeable. Case sensitivity is also a common source of error, as commands must be entered as intended (e.g. `\LaTeX{}` vs. `\textit{ff}`).

`\somecommand[optional]{obligatory}{obligatory}`

Ex. 2)

<code>\textit{Hello world!}</code>	–	puts specified text into italics
<code>\documentclass[paper=a4]{scrartcl}</code>	–	sets class of document (and specifies paper size)
<code>\textcolor{red}{Hello world!}</code>	–	applies specified colour to object

### 3.3 Line Breaks, Spaces and Indents

L<sup>A</sup>T<sub>E</sub>X mainly disregards any in-code spaces or line breaks, i.e. they have no visual impact on the actual text document. For example, a sentence can be spread across several lines of code without disrupting the text output. In the same way, any number of spaces can be inserted between code elements without them being transferred to the text document. The only time where spacing matters is for commands, as they cannot be broken up. Compare:

Code	Output
I'm just a simple example trying to make my way through the universe.	I'm just a simple example trying to make my way through the uni- verse.

To specifically include line breaks in a text, one may choose from various options such as:

- `<empty line>` (creates new line)
- `\newline` (same as `<empty line>`)
- `\hfill \break` (same as `<empty line>`)
- `\bigskip` (creates vertical space, ordinarily one line)

Code	Output
You don't need to see  my identification. <code>\newline</code> I'm the example you're looking for. <code>\hfill \break</code> I can go about my business. <code>\bigskip{}</code>  Move along!	You don't need to see my identification. I'm the example you're looking for. I can go about my business.  Move along!

For horizontal spacing some of the more widely spread commands include:

- `<empty space>` (inserts a standard horizontal space)
- `\enspace` (inserts a horizontal space of 0.5em)
- `\quad` (inserts a horizontal space of 1em; can be stacked)
- `\qquad` (inserts a horizontal space of 2em; same as `\quad \quad`)
- `\hskip<len>` (inserts a space of specified length; can be negative)
- `\hspace{<len>}` (inserts a space of specified length + 1 standard space; can be negative)
- `\hfill` (inserts rubber space that stretches acc. to available space)

Code	Output
Hello there!	Hello there!
Hello <code>\enspace</code> there!	Hello   there!
Hello <code>\quad</code> there!	Hello     there!
Hello <code>\qquad</code> there!	Hello       there!
Hello <code>\hskip</code> 1.2cm there!	Hello       there!
Hello <code>\hspace</code> {1.2cm} there!	there!Hello
<code>\hspace</code> {0.9cm} Hello <code>\hspace</code> {-2.1cm} there!	You    are    a    bold    one.
You <code>\hfill</code> are <code>\hfill</code> a <code>\hfill</code> bold <code>\hfill</code> one.	

Outside of environments (see XXX) the first line of a paragraph is always indented by default. To manually insert indents one may use horizontal spacing commands such as the above, while the `\noindent` command removes the default indentation:

Code	Output
<p>Strong I am with indenting, but not that strong. Twilight is upon me and soon night must fall.</p> <p><code>\bigskip</code></p> <p><code>\noindent</code> Soon I will rest. Yes, forever</p> <p><code>\hspace{0.3cm}</code> sleep. Earned it, I have.</p>	<p>Strong I am with indenting, but not that strong. Twilight is upon me and soon night must fall.</p> <p>Soon I will rest. Yes, forever sleep. Earned it, I have.</p>

Finally, in-code indents may serve as a simple way to structure and organise the code to make it more readable and accessible.

### 3.4 Comments, Special Characters and Quotation

Comments in programming are explanations or annotations in the source code that intend to make the code easier for human readers to understand and that are usually ignored by the compiler or interpreter (and hence not executed). In  $\text{\LaTeX}$  comments are marked through the percentage sign (%).

Code	Output
<p><code>% Sets text to italics</code></p> <p><code>\textit{Comment or comment not. There is no try.}</code></p>	<p><i>Comment or comment not.</i></p> <p><i>There is no try.</i></p>

Special characters like `\`, `$` or `%` are often used as operators in  $\text{\LaTeX}$  and thus need a little bit of work around to be included in-text. Some characters can be used by simply prefixing a backslash, others require a unique command:

Special Characters			
Backslash Commands		Unique Commands	
Command	Character	Command	Character
<code>\#</code>	#	<code>\textbackslash</code>	<code>\</code>
<code>\\$</code>	\$	<code>\textasciicircum</code>	<code>^</code>
<code>\%</code>	%	<code>\textasciitilde</code>	<code>~</code>
<code>\&amp;</code>	&	<code>\infty</code>	<code>\infty</code>
<code>\{</code>	{	<code>\triangle</code>	<code>\triangle</code>
<code>\}</code>	}	...	...
<code>\_</code>	—		
...	...		

Quotation marks are prone to displaying errors, depending on the editor that is used. One of the safest ways to include quotation marks in a text is via the `\enquote{}` function from the ‘csquotes’ package, which can be conjoined with the `\foreignlanguage{}` function from the ‘babel’ package to allow for language appropriate quotation. Both packages need to be loaded in via the `\usepackage{}` command (see XXX) in the preamble and can be modified with optional arguments such as the desired languages for the ‘babel’ package and different styles for the ‘csquotes’ package (for example, ‘autostyle’ continuously adapts the quote style to the current document language).

The standard command `\enquote{}` inserts double quotation marks, but can be modified with an asterisk to switch to single quotation marks (i.e. `\enquote*{}`). Finally, quotes may be nested with `\enquote{\enquote{}}` to achieve quotation within quotation.

#### Code

```
% Load packages in preamble

\usepackage[english, french, german]{babel}
\usepackage[autostyle]{csquotes}

\foreignlanguage{english}{\enquote{Do or do not. There is no try.}} \bigskip
\foreignlanguage{english}{\enquote*{Do or do not. There is no try.}} \bigskip
\foreignlanguage{german}{\enquote{Do or do not. There is no try.}}
\enquote{Yoda, \enquote{Darth Vader} and Luke}
```

#### Output

```
“Do or do not. There is no try.”
‘Do or do not. There is no try.’
„Tu es oder tu es nicht. Es gibt kein Versuchen.“
„Yoda, ‚Darth Vader‘ and Luke“
```

### 3.5 Environments

In  $\text{\LaTeX}$  environments are macros that can be used to apply specific formats to a section of the document, for example to align or centre text, to generate a table or to

create lists. To initiate an environment the `\begin{}` command is used, which must be closed with the `\end{}` command. Options must be placed after the environment name to avoid any collisions. Finally, environments can in themselves contain (further) environments, which, however, must be closed before the overarching environment ends:

```
\begin{environment1}[options]
  \begin{environment2}[options]
    ...
  \end{environment2}
\end{environment1}
```

Code	Output
<pre>\begin{center}  You've failed, your highness. I'm an example, like my father before me.  \end{center}</pre>	<p>You've failed, your highness. I'm an example, like my father before me.</p>

Some of the most important environments are:

- Text Alignment
  - ***flushleft*** (left aligns the text)
  - ***center*** (centres the text)
  - ***flushright*** (right aligns the text)
- Enumerations/Lists
  - ***itemize*** (creates a list with bullet points)
  - ***enumerate*** (creates a list with numbers)
  - ***description*** (creates an unmarked list of a bold and normal element)
- Graphics
  - ***figure*** (allows for embedding of graphical elements such as images)
  - ***tabular*** (creates a table)
- Others
  - ***document*** (creates the main body of the document)
  - ***verbatim*** (displays the source text without being interpreted)

## 4. Packages

Packages are macros that supplement the base functionality of  $\text{\LaTeX}$  by adding on new functions or features. To use packages they first need to be loaded in, which can be done by including them in the preamble via the `\usepackage{}` directive. Once a package is loaded in any function from that package may be called upon (e.g. the `\enquote{}` function from the ‘csquotes’ package). Common packages include:

- `rerunfilecheck` (...)
- `fontspec` (...)
- `babel` (...)
- `hyperref` (...)
- `bookmark` (...)
- `ams` (...)
- `tikz` (...)
- `microtype` (...)