

Get T_EXnical

The Very Basic T_EXniques of L^AT_EX

Use L^AT_EX to make articles, books, formulas and even slideshows!

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King's College London
UEL CDT Maker Club Takeover

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- 7 Beamer for Presentations
- 8 And that's it!

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- Previously completed Computer Science BSc (First Class Honours!) at KCL in 2023 (started September 2020)
- Learnt \LaTeX in 2022-2023 to write my Bachelors thesis
- Have since used \LaTeX to write reports, papers, CVs and presentations

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While L^AT_EX sees greater use in academia, particularly with conference and journal papers (it’s especially good for mathematical formulae), it’s so vast and flexible that it can effectively be used for most documents, whether you’re in academia or not, including books, CVs and even presentations!

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- Easier to handle bibliographies and citations using BibTeX
- Can handle multiple languages (including right-to-left written ones such as Arabic)

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- 6 Tables, as they are too complex to type out in L^AT_EX; I will show you a tool you can use to design your own tables and convert to L^AT_EX

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```
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```
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```

We can then write anything we want in that document:

```
\documentclass{article}
```

```
\begin{document}
```

The quick brown fox jumps over the lazy dog.

```
\end{document}
```

Some basic formatting

I won't go over *everything* to do with formatting text in \LaTeX , but I *will* go over some of the common formatting options you may use:

<code>\textbf{text}</code>	→	text
<code>\textit{text}</code>	→	<i>text</i>
<code>\underline{text}</code>	→	<u>text</u>
<code>\sout{text}</code>	→	text
<code>\TeX{}</code>	→	\TeX
<code>\LaTeX{}</code>	→	\LaTeX
<code>\newline{}</code>	→	Line break
<code>\\</code>	→	Line break
<code>4th</code>	→	4 th
<code>4\$\{\text{th}\}\$</code>	→	4 th

More on those dollar signs in that last one later!

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For example:

```
\textbf{Bold} % This command bolds the text.
```

Escaping special symbols

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For example:

<code>\textbackslash</code>	→	<code>\</code>
<code>\%</code>	→	<code>%</code>
<code>\&</code>	→	<code>&</code>
<code>\\$</code>	→	<code>\$</code>
<code>\#</code>	→	<code>#</code>

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For example, here's a command this set of slides uses to create big gaps in-between paragraphs:

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Your new command can also take in data that gets used by it:

```
\newcommand{command}[number_of_arguments]{definition}
```

For example:

```
\newcommand{\namething}[1]{My name is {#1}!}
```

```
\namething{Zishan} → My name is Zishan!
```

Headings

You can also divide your text into chapters, sections, subsections and subsubsections, and \LaTeX will format them accordingly:

```
\chapter{This is a chapter}  
\section{This is a section}  
\subsection{This is a subsection}  
\subsubsection{This is a subsubsection}
```

Creative writing and \LaTeX testing exercise

Now that you know how to set up a basic LaTeX document, it's time to start writing!

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- Any compilation errors and/or warnings you got
- *Optionally*, what you wrote about

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$$\begin{array}{ccc} \text{“} \text{“} & \rightarrow & \text{“} \\ \text{”} & \rightarrow & \text{”} \end{array}$$

(`“` = two backticks)

That's why you're quotes ended up like `”this”` and not `“this”`. Keep this in mind as you continue working with \LaTeX .

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This will render the following list:

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Spend the next minute or so writing a list of things you like doing.

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Spend the next minute or so writing a list of things you like doing. Hopefully, no weird stuff should happen (i.e. compilation warnings, errors etc.), but if anything weird *does* happen, make a note of it and get back to me afterwards.

Numbered lists

To have your lists *numbered* instead of bulleted, replace `itemize` in your list environment with `enumerate` (in both your `begin` and `end` declarations)

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To have your lists *numbered* instead of bulleted, replace `itemize` in your list environment with `enumerate` (in both your `begin` and `end` declarations), like so:

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\begin{enumerate}  
    \item I am the first item in the list!  
    \item I am the second item in the list!  
\end{enumerate}
```

Numbered lists

To have your lists *numbered* instead of bulleted, replace `itemize` in your list environment with `enumerate` (in both your `begin` and `end` declarations), like so:

```
\begin{enumerate}  
    \item I am the first item in the list!  
    \item I am the second item in the list!  
\end{enumerate}
```

This will render the following list:

- 1 I am the first item in the list!
- 2 I am the second item in the list!

Numbered list exercise

Now, let's put *this* into action as well!

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Spend the next few minutes writing either:

- A process described in order (i.e. a recipe, steps for doing something etc.)
- A ranking of anything that won't cause offence (from, e.g., best to worst, tallest to highest etc.)

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Now, let's put *this* into action as well!

Spend the next few minutes writing either:

- A process described in order (i.e. a recipe, steps for doing something etc.)
- A ranking of anything that won't cause offence (from, e.g., best to worst, tallest to highest etc.)

Again, if anything weird happens when you try to compile it, make a note of it and get back to me afterwards. We will be feeding back on both this and the previous list exercise in the next slide.

Feedback on list and numbered list exercises

So... how did you get on?

Feedback on list and numbered list exercises

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- Did your \LaTeX experience change at all?

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(Very) Basic figures

You start and end a figure like so (notice a pattern here):

```
\begin{figure}[h]  
    \textbf{Stuff$\ldots$}  
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Which produces:

Stuff...

A figure can be centred using the `\centering` command within the figure itself:

```
\begin{figure}[h]
    \centering
    \textbf{Stuff$\ldots$}
\end{figure}
```

Stuff...

Figure placement

Notice that h ?

Figure placement

Notice that `\h?` \LaTeX can place your figure within your document depending on how you want it:

- `[h]` → As it was placed in the `.tex` file
- `[t]` → Top of page
- `[b]` → Bottom of page
- `[p]` → A separate page for figures (and tables)
Try placing it as it was placed in the `.tex` file,
otherwise place at bottom of page. The above four
figure placement options can likewise be combined
in multiple ways. `[hb]` is an example of just one way.

Captions on figures

A figure can also have a `\caption{text}`:

```
\begin{figure}[h]
  \centering
  \textbf{Stuff$\ldots$}
  \caption{This is stuff!}
\end{figure}
```

Stuff...

Figure: This is stuff!

Labels for figures

You can even use a `\label{fig:label}` to easily refer to it using `\ref{fig:label}` (like this: [2](#)). Make sure the `\label{}` is placed *after* the `\caption{}`.

```
\begin{figure}[h]
    \centering
    \textbf{Stuff$\ldots$}
    \caption{This is stuff!}
    \label{fig:stuff}
\end{figure}
```

Stuff...

Figure: This is stuff!

In articles, you can use `\autoref{fig:label}` to have the text for that reference render to, for example, “Figure 3”.

One more thing on basic figures

There's just *one* more thing that a figure can take great advantage of...

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...**Images!**

One more thing on basic figures

There's just *one* more thing that a figure can take great advantage of...

...**Images!**

To replace our placeholder text (**Stuff...**) in our figure with an image, we will use the `graphicsx` package.

A note about packages

\LaTeX , by itself, is very “bare bones”, so for things like images, hyperlinks and other things that are contained in many documents, we often import “packages” that give us additional commands to use.

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Importing a package in your \LaTeX document is as simple as writing `\usepackage{package}` before your `\begin{document}` statement, and you usually do **not** need to install the package separately, as it will be included in your \LaTeX distribution (such as \TeX Live and the one that Overleaf uses). That’s *why* they’re so huge!

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We’ll be using a number of different packages to add things to our \LaTeX documents, so pay attention and keep your eyes on them!

Adding an image to our figure

First, add the following statement before your `\begin{document}` declaration: `\usepackage{graphicsx}`.

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Then, replace the placeholder text with your image (either use one of your own or download one from the web), like so:

`\includegraphics{your_image}`. You don't need to explicitly define its file type; `graphicsx` accepts most common image types, i.e. PNG, JPG et cetera.

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`\includegraphics{your_image}`. You don't need to explicitly define its file type; `graphicsx` accepts most common image types, i.e. PNG, JPG et cetera.

For example, the image placement in Figure 3 was done like so:

```
\begin{figure}[h]
    \includegraphics[scale=0.13]{me}
    \centering
    \label{fig:me}
\end{figure}
```

Scaling images

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Math mode

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Math mode is for rendering simple and complex mathematical formulae. For example, $ax^2 + bx + c = 0$ renders to $ax^2 + bx + c = 0$. You can use single dollar signs to easily place formulae in math mode “inline” within your paragraphs.

To create *dedicated* math mode placements, you can use double dollar signs ($\text{\$}$ $\text{\$}$) at both ends.

For example, $\text{\$}$ $\text{\$}$ $ax^2 + bx + c = 0$ $\text{\$}$ $\text{\$}$ produces the following:

$$ax^2 + bx + c = 0$$

You can also define a dedicated maths environment as you'd define (e.g.) a document, which will require the `mathtools` package:

```
\usepackage{mathtools}
...
\begin{math}
    ax^{2} + bx + c = 0
\end{math}
```


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\usepackage{mathtools}
...
\begin{math}
    ax^{2} + bx + c = 0
\end{math}
```

This will produce:

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Special characters within math mode

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\LaTeX allows you to use special symbols using dedicated commands. For example, instead of having to fetch out the “therefore” symbol from the web and copy-pasting it into your document (or entering a Unicode value), you can type in $\backslash\text{therefore}$ and \LaTeX will render it easily: \therefore . You can then use it within your formulae. For example:

```
\begin{math}  
      8 + 9 = 17\newline  
      \therefore 17 - 9 = 8  
\end{math}
```

$8 + 9 = 17$
 $\therefore 17 - 9 = 8$

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You can then use it within your formulae. For example:

```
\begin{math}
      8 + 9 = 17\newline
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$8 + 9 = 17$
 $\therefore 17 - 9 = 8$

Some symbols can also be entered in *normal* mode (for typing text). For example, $\backslash\text{copyright}$ renders to ©, in both normal and math mode.

Verbatim Environments

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Sometimes, you want to print certain characters and words *as they are* without any of \LaTeX 's formatting. To do that *inline*, use the `\verb|` command (note the vertical bars we use instead of curly braces here; use math mode to type in the bars). Verbatim environments are also useful for code samples, for which we need a dedicated `lstlisting` environment from the `listings` package (which you create just as you'd create documents, dedicated math environments et cetera).

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A *tiny* bit on BibT_EX

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BibT_EX uses its own file with extension `.bib`. Create one such file in your Overleaf project (ideally, for this workshop, in the same folder as your main `.tex` file). Call it, for example, `references.bib`.

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Then, import the `natbib` package (`biber` is another citation package; we'll use `natbib` for this workshop):

```
\usepackage[square,sort,comma,numbers]{natbib}.
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Then, import the `natbib` package (`biber` is another citation package; we'll use `natbib` for this workshop):

```
\usepackage[square,sort,comma,numbers]{natbib}.
```

Before you end your document, point BibT_EX to your file. After your text, it will generate a bibliography containing your citations:

```
\bibliographystyle{plain}  
\bibliography{references}
```

Types of BibT_EX entries include `article` (for journals), `book`, `manual` and `inproceedings` (for conference proceedings). There's also a catch-all `misc` type (used in the next slide) for entries that don't quite fit into the standard categories.

Your bibliography

BibT_EX files consist of one or more entries in *this* form:

```
@misc{entryid ,  
  year = {2025},  
  title = {{Get TeXNical}},  
  author = {{Rahman, Zishan}},  
  howpublished = {\url{https://www.example.com}}  
}
```

The `\url{}` command does as explained (when printing the link, it embeds the URL so it can be clicked on and opened). For it to work properly, add `\usepackage{hyperref}` to your preamble.

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Title and Table of Contents

Every book needs a title, author, publication date and list of chapters. The title, author and date you define in your **preamble**, like so:

```
\title{Get \TeX{nical}}  
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```

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As for *making* the title and table of contents show up on your \LaTeX document, that couldn't be any simpler. As soon as you begin your document:

```
\maketitle  
\tableofcontents
```

There are similar commands for glossaries and indexes (which we're not covering how to make today): `\makeglossary` and `\makeindex`.

Exercise: Your first (very short) research article

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Research articles are typically quite long and wordy, but for this exercise, I only need you to write a paragraph or two.

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Research articles are typically quite long and wordy, but for this exercise, I only need you to write a paragraph or two. Although your “article” will be short, give it a title and put yourself down as an author. A table of contents wouldn't hurt either.

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Beamer is a document class meant specifically for making slideshows, much like the ones you'd see on Microsoft PowerPoint and/or LibreOffice Impress (only with less animations and transitions, given that your \LaTeX slides will typically compile to PDF).

In a new `.tex` file, set the document class to `beamer` at the very beginning of your preamble, then set the title, author and year as you did before (I'll show you later how to make a Beamer-specific table of contents). Then, add the following to your document (within `\begin{document}` and `\end{document}`): `\frame{\titlepage}`. This will make a title slide for you.

You might notice it looks a bit *plain*. That's why you can use one of Beamer's built-in *themes* to add a bit more style to your slides. I use the "Madrid" theme, like so (in the preamble, after the document class declaration): `\usetheme{Madrid}`

How Beamer Works

Within your singular document, Beamer works with multiple “frames”, each of which connote 1 slide, including any pauses in-between (if there are any).

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As I've demonstrated here, figures, math mode, verbatim environments and links can easily be embedded into your slide, and you'd do that just as you would in an article (for verbatim environments, start your frame like so: `\begin{frame}[fragile]`).

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To add a pause to your Beamer frame couldn't be any simpler: `\pause`

Your first Beamer slide (well, *frame*)

Set up your frame as described in the previous slide, then within that frame, put in:

```
\frametitle{My first frame}  
This is text in a frame! \pause  
I just paused my slide! \pause  
Did you know you could use \verb|\href{URL}{text}|  
to embed hyperlinks into text? \pause  
\href{https://www.example.com}{Like this!}
```

Don't forget to start your frame with `\begin{frame}[fragile]` so you don't get compilation errors when trying to use `\verb!`

The results are in the next slide.

My first frame

This is text in a frame!

My first frame

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- \TeX StackExchange forum

Useful resources

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