

1 Welcome to the L^AT_EX workshop

Our workshop comprises three sessions:

Session 1 (Tuesday, 30 May 10–12): A gentle introduction to get you started. You will then be expected to work on a document of your choice (a student project, assignment, anything you want really) and come back to ...

Session 2 (Thursday, 1 June 10–12) where we will help you with your work, answer any questions, help you solve your problems, and you can discuss the problems and solutions with the other students as well. Finally,

Session 3 (Monday, 5 June 10–12) is your opportunity to showcase your work, talk about what problems you encountered and how you overcame them, and share your excitement about L^AT_EX!

2 Getting started with sharelatex

1. Go to www.sharelatex.com
2. Register with your email address and a password.
3. Create a new project. Select 'Blank Project'. Enter the name of the project, e.g., 'MyFirst-Project'.
4. You will get a template for your first project...

3 The structure of a L^AT_EX file

L^AT_EX is not like Word or other text processors; it is more like a programming language. You will write a 'source file' that L^AT_EX then processes and outputs the result in the form of a pdf.

Any L^AT_EX source file needs the following:

```
\documentclass{article}
```

```
\begin{document}
```

```
Hello World!
```

```
\end{document}
```

Of course, where I've put 'Hello World!', you will have the actual text of your document. Try the simple example above: remove the unnecessary gibberish that the project has come with, keeping only the lines given above, and write a short sentence or two. Click on **Recompile** and you will see the pdf output on the right.

The `\begin{}` and `\end{}` are special commands that enclose an **environment**, in this case it is the **document** environment. Let's have a look at some other environments. Among the most common and most useful environments are lists. Try this example:

```
\documentclass{article}
```

```
\begin{document}
```

```
Hello World!
```

```
My shopping list:
```

```
\begin{itemize}
```

```
  \item soap,
```

```
  \item bananas,
```

```
\item crisps.
\end{itemize}
\end{document}
```

Next, try replacing `itemize` with `enumerate`.

Summary:

- Every \LaTeX source file starts with `\documentclass`.
- A **command** starts with a backslash `\`. The parameters of a command are enclosed in curly brackets.
- An **environment** is a part of the document between a `\begin{...}` and `\end{...}`, where the dots are replaced with the same name of the environment.
- The text of your document is contained in a **document** environment. The part of the file before the document environment is called the **preamble**.

4 Spacing and paragraphs

It is a convenient feature of \LaTeX that any number of spaces you type between words count as one. Try:

```
Hello           World!
Here
I           am!
```

Here you can also see that end-of-line also counts as a space (in particular, it does not start a new paragraph). Some more points to make:

- Paragraphs are separated by a blank line; several blank lines act as one.
- All spaces at the beginning of a line are ignored.
- All spaces immediately after a command name are ignored. Try:
Using `\LaTeX is fun and easy!`
- If you need a space where it would otherwise be ignored, use `\` (that is, a backslash followed by a space). Try `\LaTeX\ is fun` and `\LaTeX \ is fun`.
- For vertical spaces, try `\bigskip`, `\medskip`, `\smallskip`.

5 Title and sections

A document such as an article or a coursework submission will typically have a title, author and date at the beginning. Define the title, author and date in the preamble, and then use `\maketitle` in the document to get the title:

```
\documentclass{article}

\title{My first file}
\author{John Swan}
\date{30 May, 2017}

\begin{document}
\maketitle

Hello World!
...
\end{document}
```

To define the structure of your document, use the following commands: `\section`, `\subsection`, `\subsubsection`. For example, the line

```
\section{Introduction}
```

will make a caption for your first section. Sections are numbered automatically.

6 Mathematical formulas

If $f(x) = x^2$, then $f(-3) = 9$: write `If $f(x) = x^2$, then $f(-3) = 9$` . So the dollar symbol (\$) starts and ends an ‘inline’ formula, that is, one that is contained in a line of text. Sometimes when a formula is long, tall or complex, you want it on a separate line. Such a formula starts with `\[` and ends with `\]`. For example, write `\[\int_0^\pi \sin x = 2 . \]` to get

$$\int_0^\pi \sin x = 2.$$

Such a formula is called a ‘displayed’ formula. If a displayed formula should be numbered for future reference, use `\begin{equation}` and `\end{equation}` rather than `\[` and `\]`. For example,

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1 \tag{1}$$

is written as:

```
\begin{equation}
\label{eq:1}
\lim_{x \to 0} \frac{\sin x}{x} = 1
\end{equation}
```

The label can be used to refer to the equation: `Equation~(\ref{eq:1})` produces Equation (1).

Note that:

- spaces in mathematical mode don’t make any difference;
- variables are typeset in an italic font, so use `x` wherever the variable x appears, even if not in a complex formula;
- common functions such as sin, max, etc., are typeset upright, so use commands such as `\sin`, `\max`, etc.;
- you will find many more tips in the booklet and the cheat sheets.

Now, think of the fanciest mathematical formula you know and try to \LaTeX it!

7 Packages

Many extensions to \LaTeX have been programmed by various enthusiasts. They come in the form of **packages**. If you want to use a package, you need to tell \LaTeX in the **preamble** of your file (that is, before the `\begin{document}`) using the command `\usepackage{...}`, where the dots will be replaced by the name of the package. We mention some important and interesting packages later.

8 Figures

Figures in a common format (such as jpg or png) can be embedded using the **graphicx** package. An example document:

```

\documentclass{article}

\usepackage{graphicx}

\begin{document}

\begin{figure}
  \includegraphics{bird.jpg}
  \caption{A bird.}
  \label{fig:bird1}
\end{figure}

```

Figure `\ref{fig:bird1}` shows a boat.

```

\end{document}

```

Included in this way, pictures will be numbered automatically; they will have a caption below, given by the `\caption{...}` command; they can be tagged using the `\label{...}` command; and they can be referred to using the `\ref{...}` command.

As an exercise, find and download a picture and include it in your trial file.

Line graphics can be drawn directly within the \LaTeX file using the `tikz` package; google it and read the documentation.

9 What else can \LaTeX do?

Some more things you should explore:

Tables using the `table` and `tabular` environments.

Footnotes using the `\footnote{...}` command.¹

Comments: Everything after `%` to the end of line is ignored; that's useful for comments that should not be printed or to suppress spaces that result from the end of a line in the source file.

Table of contents generated automatically using `\tableofcontents`; lists of figures and tables can also be generated.

References and bibliographies using the `\cite{...}` command, and produced either as the `thebibliography` environment, or automatically using `BibTeX`.

Quotation marks are written as `'` to open and `'` to close, or `“` to open and `”` to close. Don't ever use `"`.

Install \LaTeX on your computer.

Mac: <http://tug.org/mactex/>, Windows: <https://miktex.org>, Linux: install \TeX Live packages.

10 Additional resources

- The booklet and cheat sheets given out in Session 1.
- Some recommended resources at <http://tinyurl.com/latexresources>.
- An excellent wikibook on \LaTeX is here: <https://en.wikibooks.org/wiki/LaTeX/>.
- When you need help with a particular trick or a particular package, ask Google.

¹This is a footnote.