

# LaTeX Training Course

‘Using LaTeX to write a thesis’

UK-TUG Volunteers

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## Acknowledgements

- Volunteers:
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## 1 An overview of LaTeX

### What is LaTeX, and what is TeX?

- TeX is a typesetting application;
- TeX uses *primitives* to determine how to put text on a page;
- For most practical purposes, we need a *format* built on top of TeX, for example:
  - Plain TeX;
  - LaTeX;
  - ConTeXt;
- You can think of LaTeX as an interpreter between you and TeX.

## TeX ‘engines’

### pdfTeX

The standard binary program: we’ll be using this today.

### XeTeX

A merger of TeX with modern font technology with support for native Unicode input and bidirectional typesetting.

### LuaTeX

Also a modern engine: integrates the Lua scripting into TeX.

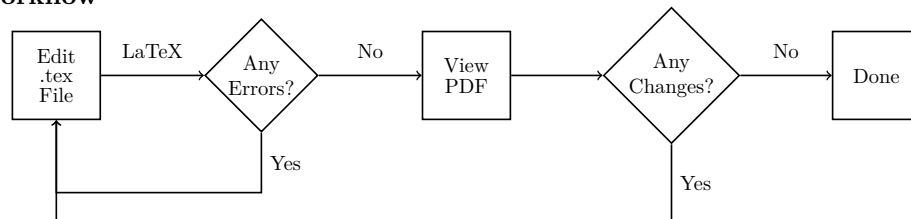
## What do we need to use LaTeX?

- A TeX distribution: TeXLive (Windows, Mac, Linux) or MiKTeX (Windows only);
- A text editor, *e.g.* Notepad, TextEdit, Emacs;
- A PDF viewer, for example Adobe Reader.

Usually, we use a specialist editor

- Coloured syntax;
- Buttons or menus to run LaTeX, *etc.*;
- Most include an integrated spell checker.

## Workflow



## 2 Getting started

### LaTeX is not a word processor

- LaTeX input is stored as plain text files, usually with the extension `.tex`;
- LaTeX input files contain both the text of the document and *control sequences*;
- Control sequences start with a slash, so look like this: `\example`
- Writing in LaTeX is therefore about *programming* it to produce the document you want.

## Special characters

Character	Use	Result
<code>\</code>	<code>\textbackslash</code>	<code>\</code>
<code>{</code>	<code>\{</code>	<code>{</code>
<code>}</code>	<code>\}</code>	<code>}</code>
<code>%</code>	<code>\%</code>	<code>%</code>
<code>~</code>	<code>\textasciitilde</code>	<code>~</code>
<code>&amp;</code>	<code>\&amp;</code>	<code>&amp;</code>
<code>#</code>	<code>\#</code>	<code>#</code>
<code>\$</code>	<code>\\$</code>	<code>\$</code>
<code>^</code>	<code>\textasciicircum</code>	<code>^</code>
<code>_</code>	<code>\_</code>	<code>_</code>

## Spacing

- LaTeX treats multiple spaces as a single space;
- By default, the space between sentences is slightly larger than the space between words;
- This can be switched off using `\frenchspacing`;
- New line characters are treated as a space;
- Paragraph breaks should be indicated by a blank line;
- LaTeX automatically indents paragraphs, except for the first paragraph after a section heading.

## A simple document

### Example 1

```
\documentclass[a4paper,12pt]{article}
% A comment in the preamble
\begin{document}
% This is a comment
This is a simple
document\footnote{with a footnote}.
```

```
This is a new paragraph.
\end{document}
```

**Exercise 1** Use the editor of your choice to create the above document. While you can use a specialist editor, start by doing this example in a basic editor such as Notepad. Save the document with a `.tex` extension, for example `exercise1.tex`, then go to a Terminal/Command Prompt and type:

pdflatex exercise1

You can then view the resulting PDF file using a PDF viewer such as Adobe Reader.

## 3 Document Classes

### Document Classes

The *document class* sets up the general layout of the document, for example:

- the format of the headings;
- if the document should have chapters;
- if the title should be on a separate page or above the text on the first page.

### Usage

```
\documentclass[options]{class-name}
```

### Base classes

**article** for short documents without chapters;

**report** for longer documents with chapters, typically single-sided with an abstract;

**book** for books, typically double-sided with front matter and back matter;

**letter** for correspondence;

**slides** for presentations.

### Modern classes

**KOMA-Script** scrartcl, scrreprt and scrbook to replace article, report and book, respectively;

**memoir** replaces book and report;

**beamer** or slides (used to create the course material).

## Documentation

### On your computer

The `texdoc` application will show documentation for material you have installed. From the Command Prompt/Terminal

```
texdoc <package>
```

### From CTAN

Try the web address

```
http://ctan.org/pkg/<name>
```

## KOMA-Script Example

```
\documentclass{screprpt}

\usepackage{lipsum}% Provides \lipsum for dummy text

\title{A Sample Document}
\author{Ann Author}

\begin{document}
\maketitle
\tableofcontents

\chapter{Introduction}

This is a sample document with some dummy
text\footnote{and a footnote}.
\lipsum
\end{document}
```

**Exercise 2** *Try creating the above document. The KOMA-Script classes have various options that affect the document's appearance. Try experimenting with some of the following: `chapterprefix`, `headings=small`, `headings=normal`, `headings=big`, `numbers=enddot`, `numbers=noenddot`. For example:*

```
\documentclass[chapterprefix]{screprpt}
```

## 4 Structure

### Title Page

First, you need to give the 'meta-data':

- `\title{title}`
- `\author{author(s)}`
- `\date{date}` (optional)

Then use `\maketitle` to display the title page.

Classes such as KOMA-Script add more items, for example `\publisher`.

### Sectioning commands

Article-like classes provide the commands:

- `\part[short title]{title}`
- `\section[short title]{title}`
- `\subsection[short title]{title}`
- `\subsubsection[short title]{title}`
- `\paragraph[short title]{title}`
- `\subparagraph[short title]{title}`

Book and report-like classes also provide the command: `\chapter[short title]{title}`

**Exercise 3** *Try producing the following document.*

```
\documentclass[oneside]{scrbook}

\usepackage{lipsum}% provides \lipsum to produce dummy text

\titlehead{University of East Anglia\\
Norwich\\
NR15 1AJ}
\subject{A thesis submitted for the degree of Doctor of Philosophy}
\title{My Thesis}
\author{Ann Author}
\date{July 2010}
\publishers{Prof.\ My Advisor}

\begin{document}
\maketitle

\frontmatter
```

```

\tableofcontents

\chapter{Foreword}

This is the foreword. It is in an unnumbered chapter.

\mainmatter
\chapter{Introduction}

This is a sample chapter with a reference to Chapter-\ref{ch:method}.

\section{Sample Section}

This is a sample section with some dummy text to pad it out. \lipsum

\chapter{Method}\label{ch:method}

This is another chapter with some more dummy text. \lipsum

\appendix % Switch to appendices

\chapter{A Sample Appendix}\label{apd:sample}

This is an appendix. \lipsum

\chapter{Another Appendix}

This is another appendix with a reference to Appendix-\ref{apd:sample}.
\lipsum
\end{document}

```

*Here are some more KOMA-Script class options to try: `appendixprefix`, `toc=flat`, `headsepline`, `footsepline`.*

## 5 Graphics

### On packages

The LaTeX kernel is rather limited: to get around that we load *packages*:

```
\usepackage[options]{package}
```

or

```
\usepackage{<package1>,<package2>,...}
```

We have already seen the `lipsum` package!

Documentation for packages is available in exactly the same way as for classes.

### Including external images

- Load the `graphicx` package to include graphics;
- Use `\includegraphics` to actually place the image;
- Image formats: `pdf`, `png`, `jpg`;
- File extension should be omitted.

Graphics can also be ‘drawn’ in LaTeX using the `Tikz` package: a course in itself!

### Floating figures

#### A basic figure

```
\begin{figure}[htbp]
\centering
\includegraphics{myimage}
\caption{A Sample Figure}
\end{figure}
```

**Exercise 4** *Try producing the following document. (Use an image application, such as `paint`, to produce a simple picture and save it as `shapes.png`.)*

```
\documentclass[oneside,numbers=noenddot]{scrbook}

\usepackage{lipsum}% provides \lipsum to produce dummy text
\usepackage{graphicx}% provides \includegraphics

\titlehead{University of East Anglia\
Norwich\
NR15 1AJ}
\subject{A thesis submitted for the degree of Doctor of Philosophy}
\title{My Thesis}
\author{Ann Author}
\date{July 2010}
\publishers{Prof.\ My Advisor}

\begin{document}
\maketitle

\frontmatter
```

```

\tableofcontents
\listoffigures

\chapter{Foreword}

This is the foreword. It is in an unnumbered chapter.

\mainmatter
\chapter{Introduction}

This is a sample chapter with a figure and a reference to Chapter~\ref{ch:method}.

\begin{figure}[htbp]
\centering
\includegraphics{shapes}
\caption{Some Shapes}
\end{figure}

\section{Sample Section}

This is a sample section with some dummy text to pad it out. \lipsum

\chapter{Method}\label{ch:method}

This is another chapter with a reference to Figure~\ref{fig:shapes}
and some more dummy text.

\begin{figure}[htbp]
\centering
\includegraphics[scale=0.5,angle=45]{shapes}
\caption{A Sample Figure}\label{fig:shapes}
\end{figure}

\lipsum

\appendix % Switch to appendices

\chapter{A Sample Appendix}\label{apd:sample}

This is an appendix. \lipsum

\chapter{Another Appendix}

This is another appendix with a reference to Appendix~\ref{apd:sample}. \lipsum
\end{document}

```

Here are some more class options to try that will affect the list of figures: *chapteratlists*, *chapteratlists=0mm*.

## 6 Bibliographies

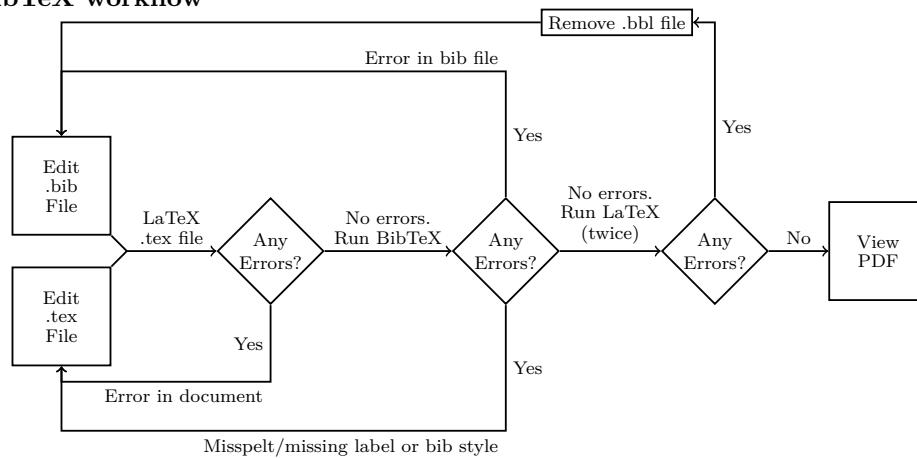
### Creating a bibliography

- Entries are stored in a *BibTeX database*;
- Inform LaTeX about it using `\bibliography` command;
- These are cited using `\cite` in the LaTeX file;
- Choose a style using `\bibliographystyle`.

### Creating a bibliography The LaTeX basics

```
\documentclass{article}
\usepackage{natbib}
\bibliographystyle{plainnat}
\begin{document}
Some text \cite{key}.
\bibliography{example}
\end{document}
```

### BibTeX workflow



### The BibTeX file A basic article

#### Example 2

```

@article{lampport94,
  author   = "Leslie Lamport",
  title    =
    "{\LaTeX}: a document preparation system",
  edition  = "2nd",
  publisher = "Addison--Wesley",
  year     = 1994,
}

```

## The BibTeX file Multiple authors

### Example 3

```

@inproceedings{smith05,
  author   = "Smith, Jr, John and Jane Lucy Doe
    and and Other, Andrew N. and de Vere, Jo",
  title    = "An example article",
  booktitle = "Proceedings of the Imaginary Society",
  month    = JAN
  year     = 2005
}

```

## Citations in LaTeX

- The LaTeX kernel is limited for citations;
- The natbib package is much more powerful;
- A new approach is provided by biblatex.

## Citations using natbib

### Textual citations

```

\citet[note]{key}
\citet{lampport1994}      ⇒ Lamport (1994)
\citet[p.~34]{lampport1994} ⇒ Lamport (1994, p. 34)

```

### Parenthetical citations

```

\citep[prenote][postnote]{key}
\citep{lampport94}      ⇒ (Lamport, 1994)
\citep[p.~34]{lampport94} ⇒ (Lamport, 1994, p. 34)
\citep[see][]{lampport94} ⇒ (see Lamport, 1994)

```

**Exercise 5** Create a file called *myrefs.bib* that contains the following:

```
@inproceedings{smith05,
  author = "Smith, Jr, John and Jane Lucy Doe and Jo de Vere",
  title = "An example article",
  booktitle = "Proceedings of the Imaginary Society",
  month = JAN,
  year = 2005
}
```

```
@book{lampport94,
  author = "Leslie Lamport",
  title = "{\LaTeX} : a document preparation system",
  edition = "2nd",
  publisher = "Addison-Wesley",
  year = 1994
}
```

*Then create a file called, say, `example5.tex` that contains the following:*

```
\documentclass{article}

\usepackage{natbib}
\bibliographystyle{plainnat}

\begin{document}
Main matter with citations such as \citet{lampport94}.

\bibliography{myrefs}
\end{document}
```

*If you are using a terminal or command prompt, you will need to use the following commands:*

```
pdflatex example5
bibtex example5
pdflatex example5
pdflatex example5
```

*There are various options you can pass to the `natbib` package that affects the formatting. For example:*

```
\usepackage[numbers,sort&compress]{natbib}
```

*Try experimenting with some of these options: `round`, `curly` and `numbers`. With the `numbers` option, you can also use: `super`, `sort` and `sort&compress`.*

## 7 Further information

### Getting help

- [www.tex.ac.uk/faq](http://www.tex.ac.uk/faq);
- [www.latex-community.org](http://www.latex-community.org);
- [tex.stackexchange.com](http://tex.stackexchange.com);
- [theoval.cmp.uea.ac.uk/~nlct/latex/](http://theoval.cmp.uea.ac.uk/~nlct/latex/).

### Reading

- *Not So Short Introduction to LaTeX2e*, Oetiker;
- *A Guide to LaTeX*, Kopka and Daly;
- *LaTeX Beginners Guide*, Kottwitz.