Introduction to LaTeX
In aid of C.M.R.F

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To teach fellow students a tool which can really helps with their academic commitments.

To support a cause that is deeply important to us.

The best way to learn LaTeX is by jumping in head first and learning by writing a lab report and researching things as you complete it. This workshop is just to point you in the right direction and what to look out for throughout the process.
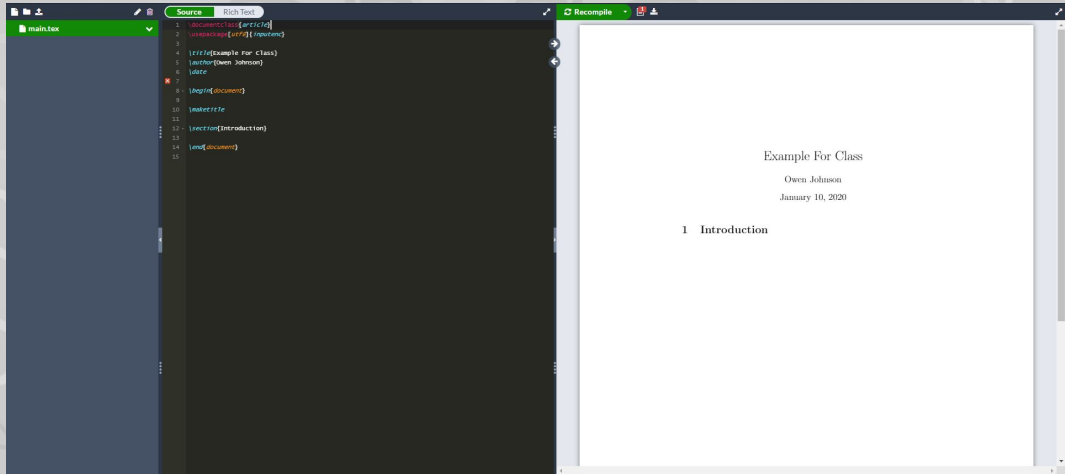

YOU BEST BE DIVING HEAD
FIRST INTO LATEX

Created in 1984 LaTeX is a typesetting program. It's extraordinarily popular amongst Physicists, Mathematicians and Computer Scientists for writing anything from exams and notes to thesis and books. About 18 % of all academic papers are written in LaTeX with 90 % of mathematicians writing their papers in LaTeX and over 60 % of Physicists using it for their papers.

- Setting up Overleaf
  - $\rightarrow$ Create account using student email
  - $\rightarrow$ Use the create a project prompt to start a new blank document
- Getting acquainted with the user interface of Overleaf
  - $\rightarrow$ **Left margin**   File organiser
  - $\rightarrow$ **Left panel**   .tex file editor
  - $\rightarrow$ **Right panel**   .pdf preview

main.tex

Source | Rich Text

Recompile

```
1  \documentclass{article}
2  \usepackage[utf8]{inputenc}
3
4  \title{Example For Class}
5  \author{Owen Johnson}
6  \date
7
8  \begin{document}
9
10 \maketitle
11
12 \section{Introduction}
13
14 \end{document}
15
```

Example For Class

Owen Johnson

January 10, 2020

1 Introduction

There are a few terms which we will need to be able to talk about LaTeX.

- Preamble
- Packages
- Environment
- Command

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```

Red is highlighting the preamble' → where all packages go
Green is highlighting the 'document input' → where all document content goes

Setting up the document

- \documentclass[options]{class}
- For example: \documentclass[A4,12pt]{report}

- Margins of the document are defined in preamble.
- This is done using the **Geometry** package
- Alternatively for lab reports the **fullpage** package can be used

- Title pages can either be defined in the preamble or the document itself.
- The title page can be added using the `\maketitle` command or by using the **titlepage** environment.

- Sections
- Subsections
- Subsubsections

All aspects of the sections portion of LaTeX can fully modified, see further reading.

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- LaTeX renders the table of contents automatically using the section hierarchy.
- Hyperlinks are automatically created within the TOC.
- The TOC command (`\tableofcontents`) is called at the desired location within the document.
- The style and layout of the TOC can be manipulated in the preamble.

Spreading work across multiple .tex files can make working on a project much more organized and efficient.

- Creation of .tex files
- Naming of .tex files
- Inputting of .tex files in LaTeX

- As LaTeX is commonly used for writing reports and scientific papers it has built in abstract environments.
- To use this simply type your abstract in an **abstract** environment.
- This will make the width of the abstract slightly thinner than the rest of the text.

- Organising (ie. commenting) your code can be extremely helpful when debugging or reusing code.
- Comments are notes in the code which will not be printed on the actual document.
- Comments are added by using the % symbol. Anything after this symbol wont be printed. Note: Use \% symbol to type % .

Adding Text

When adding text to a LaTeX document there are a few important things to note.

- \\ is used to start a new line
- Pressing enter twice will start a new indented paragraph.
- \indent and \noindent can be used to add or remove an indent

- To change the font size we can add a command such as `\Huge{text here}`.

→ The text in the brackets will appear bigger.

- The following commands can also be used to make text bold/italicised/ underlined.

Bold	`\textbf{}`
Italic	`\textit{}`
<u>Underlined</u>	`\underline{}`

Tables

- The package required for inserting tables is **tabularx**

- Tables are put inside **table** environment which contains the caption, label, positioning commands and a tabular/tabularx environment

- The actual data entries of the table are placed inside a **tabular** or **tabularx** environment.

V_A (Volts)	I_B (Amps)	B (Teslas)
1000 ± 50	1.8 ± 0.1	$8.66 \times 10^{-3} \pm 6.5 \times 10^{-5}$
1500 ± 50	2.3 ± 0.1	$1.106 \times 10^{-2} \pm 7.3 \times 10^{-5}$
2000 ± 50	2.5 ± 0.1	$1.202 \times 10^{-2} \pm 7.7 \times 10^{-5}$
2500 ± 50	2.9 ± 0.1	$1.394 \times 10^{-2} \pm 8.5 \times 10^{-5}$
2700 ± 50	3 ± 0.1	$1.443 \times 10^{-2} \pm 8.7 \times 10^{-5}$

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- Sometimes you might need to insert a table which has a lot of entries and won't fit on one page.
- A table that runs over more than one page can be done using the **longtable** package.

- If you want to insert a very wide table with many columns it may go off the right hand side of the page.
- This is because LaTeX won't automatically recenter something which enters the margins of the page
- To fix this we use the **adjustbox** environment

Sometimes we need to add tables with large amounts of text. There are two ways to deal with this.

- Using **p**{width} we can fix the width of a column - anything wider than this will move onto a new line.
- Alternatively, the **tabularx** environment can be used instead of the **tabular** environment

Figures

The three main packages used for inserting figures in LaTeX are:

- graphicx
- wrapfig
- subcaption (Side by side figuires captions)

- Importing images

→ This will depend on your compiler, we will use Overleaf for this demonstration.

- Inserting figures.

→ Figures are placed in a **figure** environment.

→ The figure itself is added using the `\includegraphics{place figure file here}` command.

- Sizing the items of figures
- → This is done by typing \includegraphics**[width =]**{name of image file}
- Captions
- → Captions are added using the **caption** command

There are many other ways in which we can customize the formatting of a image in LaTeX which can be complicated to use.

- •Wrap figures
- •Multi-figures
- •Multiple sub captions

Note: To use these functions the following packages are required:

→ wrapfig

→ subcaption

Inputting Maths

- There are a few different packages to type equations in LaTeX.
- The main package used is the **amsmath** package.
- For some very specific symbols you may also need the **amssymb** package but this is not very common.

- There are two main ways to type mathematical equations in LaTeX.
- The first is to enclose the maths type in between two $ signs - this works well if you want to type maths within text.
- The second is to use an **equation** environment or the **equation*** environment if you don't want your equation to be numbered.

Code & Commands

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- Listing & Verbatim packages
- Beginning environments
- Styles of a listings environment & verbatim

- Defining code
- Renewing commands

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Printing code within LaTeX

- Sometimes it is necessary to include pieces of code in a document that the compiler would normally interpret as LATEX code.
- To avoid this we use the **verbatim** environment.
- If we are only inserting a single word it is easier to use the command `\verb||`.

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- Verbatim
- Listings
  - Custom styles
  - Frames, thickness, sizes and languages

Referencing in LaTeX

- Labelling equations, tables and figures
- BibTeX
  - Creating a .bib file
  - Adding entries to a .bib file
  - Adding the bibliography to document
    - Changing styles
  - Referencing the entries within the text
  - Other packages *(BiBTeX is 35 years old)*

Debugging LaTeX code

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As with any coding language debugging the code is very important. Some common things to watch out for are:

- Check that all brackets are closed.
- All environments must be closed
- All mathematical equations are contained in maths environments.

Questions?
Feedback?