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Coding Hours

LaTeX Workshop

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What is LaTeX?

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- Tool used to create professional-looking documents
  - Research papers
  - Presentations
  - CV's
- Pronounced as *LAY-tek* or *LAH-tek*
- WYSIWYM: What You See Is What You Mean
  - Focus on contents of your document
  - Automatic formatting

Why learn LaTeX?

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- Standard for scientific documents
- Quickly tackle the most complicated parts of typesetting
  - Mathematics
  - Tables of Contents
  - Referencing and creating bibliographies
- Consistent layout

Why learn LaTeX?

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- Excellent package support
- Standardized documents
- Hundreds of templates available
- Great community support

How to learn LaTeX?

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- Start with a tutorial
- Learn by doing
- Focus on learning what you need
- Google and StackOverflow are your best friends

Creating your first working file

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- Create an Overleaf account
- Under '*My Projects*' start a 'Blank project' and give it a name

TIP: Why do the work yourself? Use templates!

Analyzing your first document

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```
\documentclass{article}
\usepackage[utf8]{inputenc}

\title{PROJECT_NAME}
\author{AUTHOR_NAME}
\date{MONTH_YEAR}

\begin{document}

\maketitle

\section{Introduction}

\end{document}
```

- The content, also known as the *body* of the document, is written in the *document environment*.
- Environments start with *begin{ENV_NAME}* and end with *end{ENV_NAME}*.
- Meta data, settings and information about the document, is written above the document environment.

Analyzing your first document

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```
1  \documentclass{article}
2  \usepackage[utf8]{inputenc}
3
4  \title{PROJECT_NAME}
5  \author{AUTHOR_NAME}
6  \date{MONTH_YEAR}
7
8  \begin{document}
9
10 \maketitle
11
12 \section{Introduction}
13
14 \end{document}
```

- The first line of code declares the type of document, known as the *class*.
- The class controls the overall appearance of the document.

Analyzing your first document

```
\documentclass{article}
\usepackage[utf8]{inputenc}

\title{PROJECT_NAME}
\author{AUTHOR_NAME}
\date{MONTH_YEAR}

\begin{document}

\maketitle

\section{Introduction}

\end{document}
```

- The *usepackage* command is used to import external code.
- In this case, it imports *utf8* which is a collection of characters.
- Without including this, some characters such as Ǫ and ß might not be supported.

Analyzing your first document

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```
\documentclass{article}
\usepackage[utf8]{inputenc}

\title{PROJECT_NAME}
\author{AUTHOR_NAME}
\date{MONTH_YEAR}

\begin{document}

\maketitle

\section{Introduction}

\end{document}
```

- The *maketitle* command prints the title to the document.
- The *title*, *author* and *date* command initialize the title, author and data used by the *maketitle* command, respectively.

Exercise: Try to change the title of the project and the name of the author and see what happens.

Compiling your first document

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- LaTeXcode needs to be compiled to generate the output.
- To do this in Overleaf, simply hit '*Recompile*'.

Exercise: Recompile your file after having made some changes.

TIP: You can also set your project to automatically recompile when you edit your files, by clicking on the small arrow next to the '*Recompile*' button and set '*Auto Compile* to '*On*'.

Adding comments to your document

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- It is often useful to include comments in your code.
- Comments are pieces of text you can include in the document which will not be printed.
- Comments start with a % symbol as is shown in the example on the right.

```
\begin{document}

\maketitle

We have now added a title, author and date to
our first \LaTeX{} document!

% This line here is a comment. It will not be
printed in the document.

\end{document}
```

Exercise: Add two comments to the document; one in the preamble and one in the body of the document.

Bold, italicised and underlined text

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- **Bold**: Bold text is written with the *\textbf{...}* command.
- *Italics*: Italicised text is written with the *\textit{...}* command.
- Underline: Underlined text is written with the *\underline{...}* command.

Exercise: Add some text under *\section{Introduction}* and make a part of it bold, italicised and underlined. Next, try to make a part of the text both bold and italicised.

Structuring your document

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- LaTeX allows users to structure their documents with a variety of hierarchical constructs, including chapters, sections, subsections and paragraphs.
- The basic levels of depth are listed below:

0	\chapter{*CHAPTER_TITLE*}
1	\section{*SECTION_TITLE*}
2	\subsection{*SUBSECTION_TITLE*}
3	\subsubsection{*SUBSUBSECTION_TITLE*}
4	\paragraph{*PARAGRAPH_*TITLE}
5	\subparagraph{*SUBPARAGRAPH_TITLE*}

Exercise: Add more sections and subsections to your document and check how everything is formatted.

Adding a Table of Contents

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- To create the table of contents (ToC), use the *tableofcontents* command.
- The ToC will be automatically updated when you make changes to your document.
- The depth of the ToC can be changed so that different levels of headings are listed.

Exercise: Add a table of contents at the top of your document.

Time to practice!

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- The best way to learn how to work with LaTeX is by doing.
- In the remainder of this session, you can work on assignments that will get you familiar with the language.
- Before you start working on the assignments, please read through the following tutorial.

Assignment 1 — Adding images

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1. Read the Adding images and the Captions, labels and references sections in the linked tutorial.
2. Add an image to your document.
3. Resize the image to half the page width. (Note that you can use 0.5*pagewidth* to set the width)
4. Add a caption to your image.
5. Add a label to your image and add text in which you refer to the image below the image.

Assignment 2 — Adding math

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1. Read the Adding math to LaTeX section in the linked tutorial.
2. Add $y = f(x)$ in your document in *inline* mode.
3. Now add the same, but do it in *display* mode.
4. Import the *amsmath* package and add the following mathematical expression to your document:

$$\mathbb{E}_X[X] = \int_{-\infty}^{\infty} x f_X(x) \mathrm{d}x.$$

TIP: When you do not know the command for a symbol, draw it in detexify to find out!

Assignment 3 — Adding tables

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1. Read the Creating tables section in the linked tutorial.
2. Add the following table to your document:

1	2	3
4	5	6
7	8	9

TIP: The online Tables Generator can be a handy tool to create your tables.

Assignment 3 — Adding tables (Cont'd)

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4. Add the following table to your document:

Name	Score 1	Score 2	Score 3
Alan Turing	10	10	10
Steve Jobs	9	6	10

Table: Table of test scores.

Note that the first column is aligned to the left and the other columns are aligned in the center.

TIP: Most software packages and programming languages support generating LaTeX tables. Examples are R, Stata, Python, Eviews, and Java.

Assignment 4 — Adding references and citations

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1. Read the Bibliography management with natbib article.
2. Add the '*The anatomy of a large-scale hypertextual Web search engine*' by Sergey Brin and Lawrance Page to your references and cite the paper in your document.

TIP: Overleaf can be linked to tools for references and citations such as Mendeley and Zotero.

Assignment 5 — Working with templates

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- Writing all documents from scratch is not very efficient.
- Fortunately, there are very elegant and well-structured templates available for you to use.
- Take a look at this Masters/Doctoral Thesis template and try to understand how it is structured.

Recommended resources

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- Overleaf offers the best documentation and tutorials for both beginners as well as more experiences LaTeXusers.
- Always work with templates! The Overleaf templates repository is a great place to start.
- Focus on learning what you need to write your documents. LaTeXis hugh and very complicated and therefore you will never fully understand it.