



# Introduction to LaTeX

Sebnem Manolya Demir

Jumpstart Summer Program 2023

Data Sciences and Operations Department, USC Marshall

# Tutorial Links

- Creating your first document:  
<https://www.overleaf.com/read/fttrjctxsqqxn>
- Preamble: <https://www.overleaf.com/read/xjcfhvbnyvbn>
- Common Operations: <https://www.overleaf.com/read/gbqfzqhwpdrh>
- Document Organization:  
<https://www.overleaf.com/read/vrjhfrwhdhdq>
- References: <https://www.overleaf.com/read/grdcqfzgmgkc>
- Beamer 1: <https://www.overleaf.com/read/kpfpwrjvnqxv>
- Beamer 2: <https://www.overleaf.com/read/gckpdtzrtjck>
- Beamer Poster Example:  
<https://www.overleaf.com/read/rbbqydjcfgwn>
- Poster Template:  
<https://www.overleaf.com/1323945199gbttqwbxqnnq>

# Agenda

- **Section 1:** What is LaTeX?
- **Section 2:** Installation and Overleaf
- **Section 3:** Creating your first document
- **Section 4:** Common operations
- **Section 5:** Beamer
- **Section 6:** Posters in LaTeX

# Section 1: What is LaTeX?

“a tool for typesetting professional-looking documents”

**other document-production applications**  
(such as Microsoft Word or LibreOffice Writer)

vs

**LaTeX**

What you see is what you get

- Formatting (visual appearance) ✓
- Mathematics and technical content ✓
- Management of document elements ✓
- Bibliographies ✓

LaTeX *commands*



TeX *engine*



professionally  
typeset PDF file

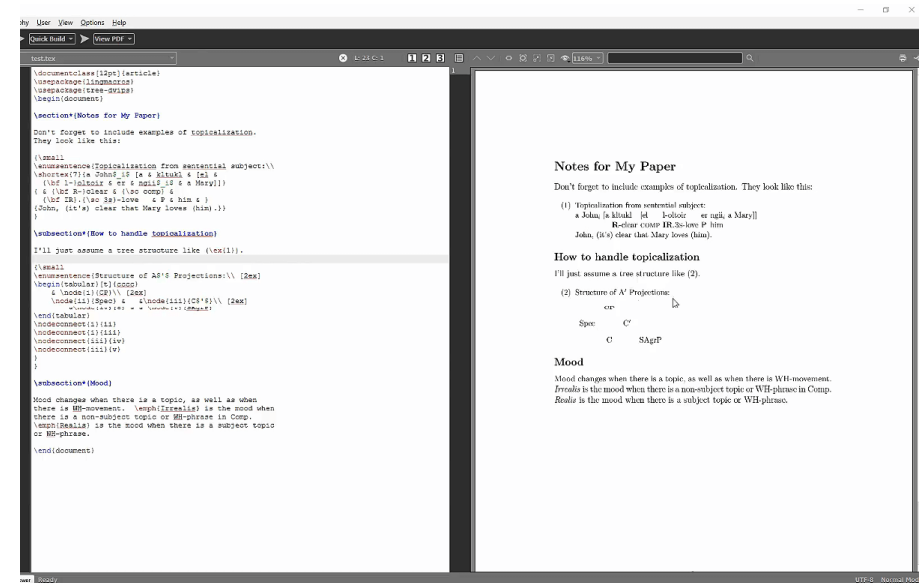
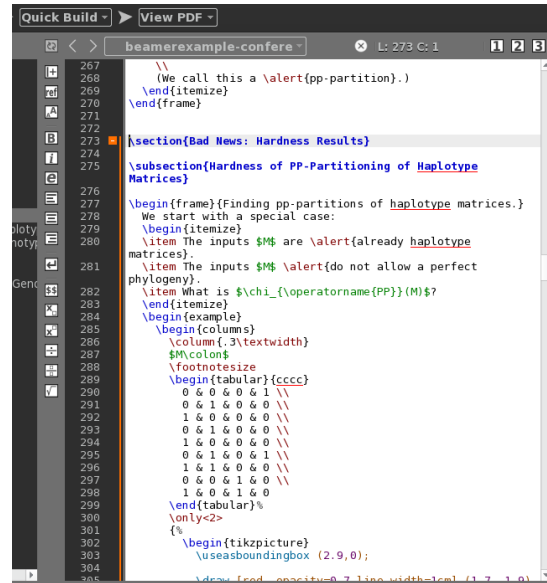
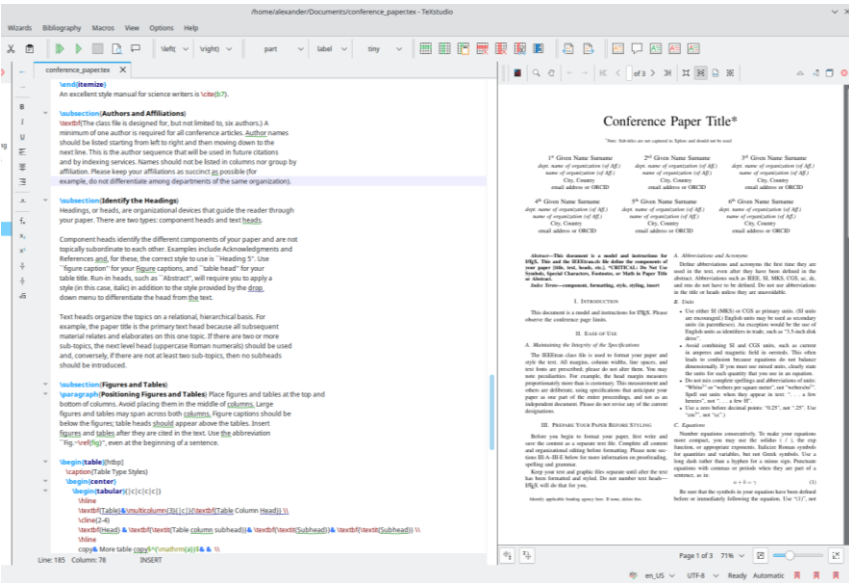
# Section 2: Installation and Overleaf

## 1. You can install a LaTeX editor on your device

TeXstudio

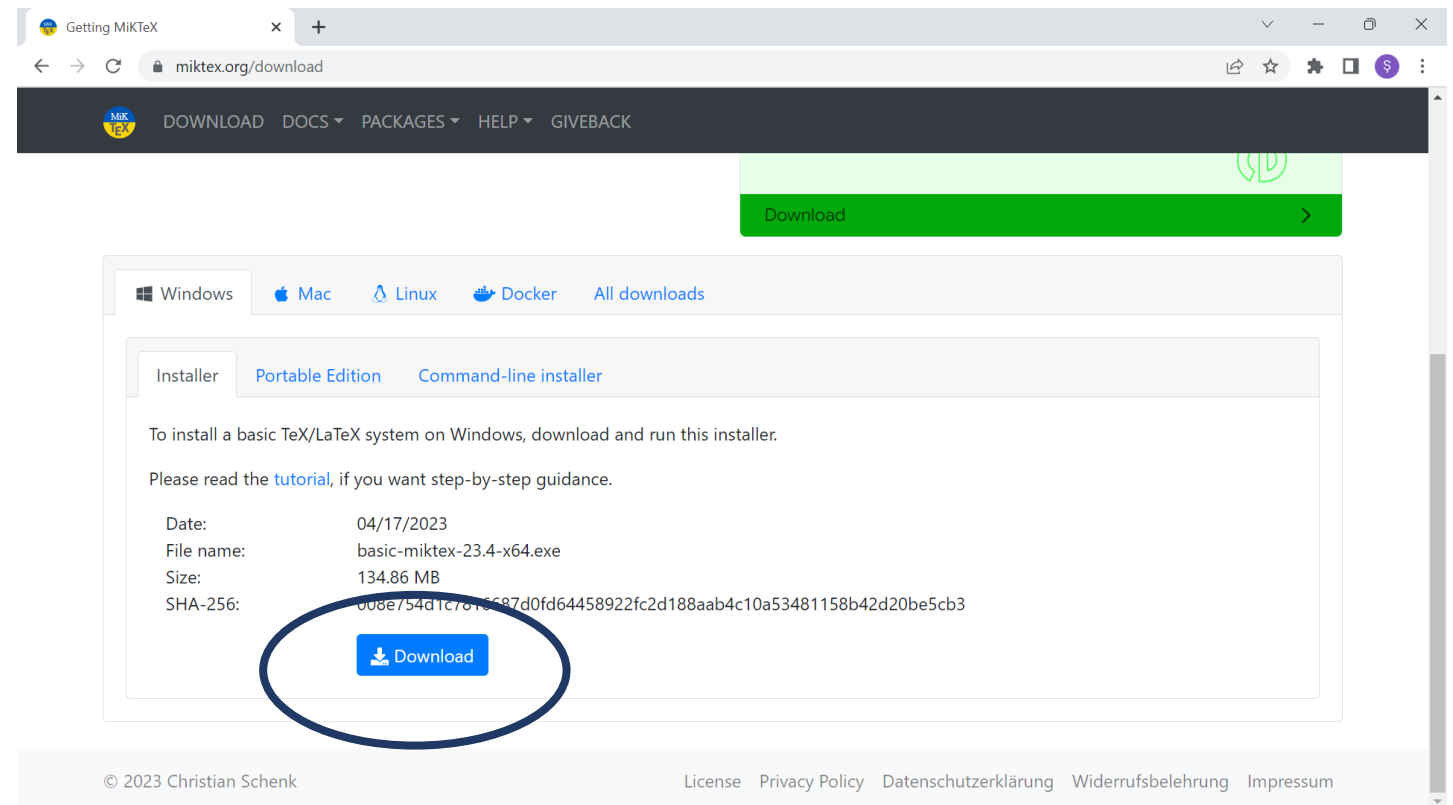
TeXmaker

MiKTeX



# Downloading MiKTeX


1. Go to <https://miktex.org/download>
2. Start downloading.
3. Once downloaded, run MiKTeX installer.
4. Better to choose to install missing packages automatically.
5. Open TeXworks and you are ready to go!





# Section 2: Installation and Overleaf

2. You can use the online editor **Overleaf** on <https://www.overleaf.com>

## Log in to Overleaf

 Log in with Google

 Log in with ORCID

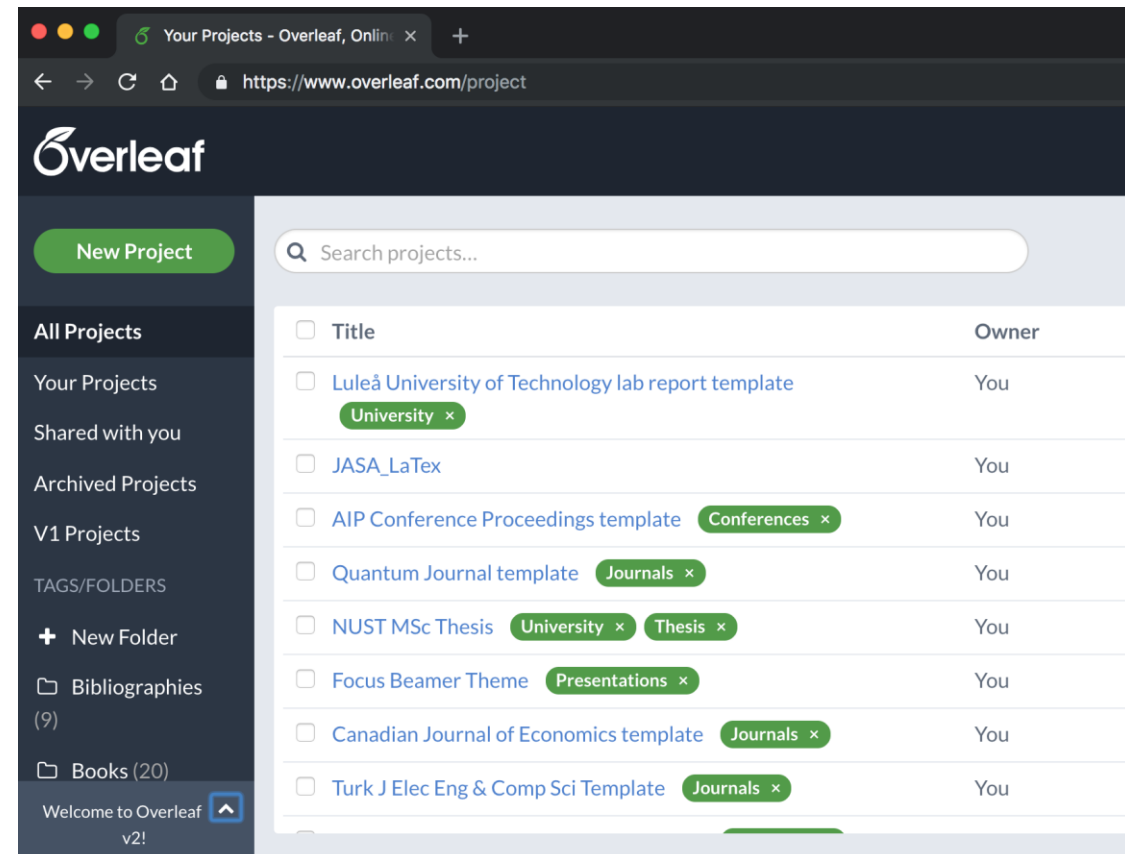
 Log in with IEEE

[▶ Log in with Twitter ...](#)

or

Logging in...

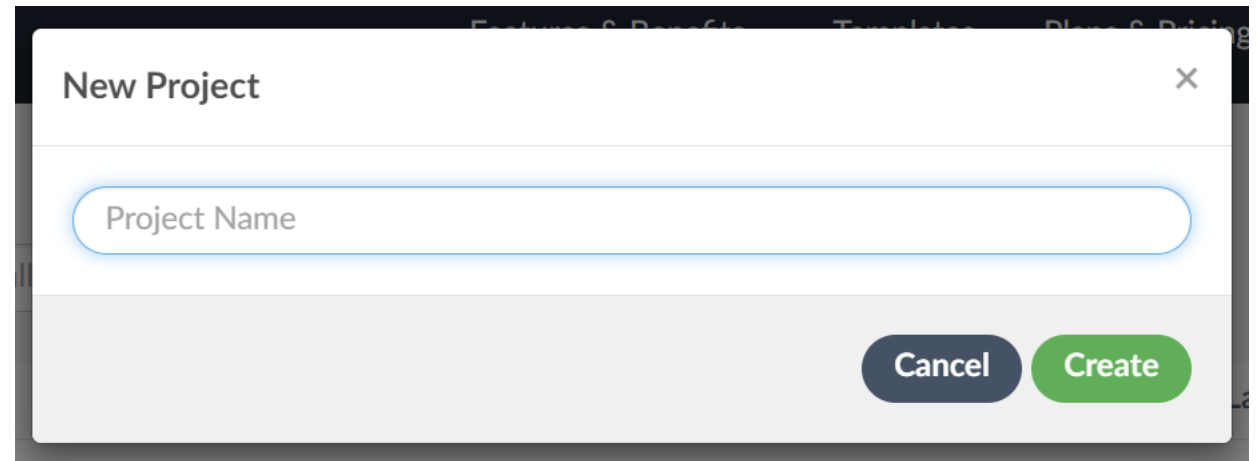
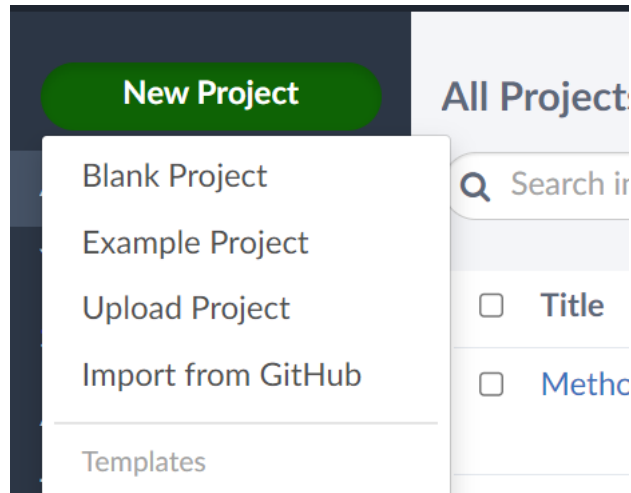
or



# Section 3: Creating your first document

## 1. Creating a Project

- To start using LaTeX, create a new .tex file.
- Once you log into your account, go to <https://www.overleaf.com/project>.
- Click on **New Project** and select Blank Project.
- Name your project and select Create. It is ready to go!





# Section 3: Creating your first document

## 2. Writing your Codes

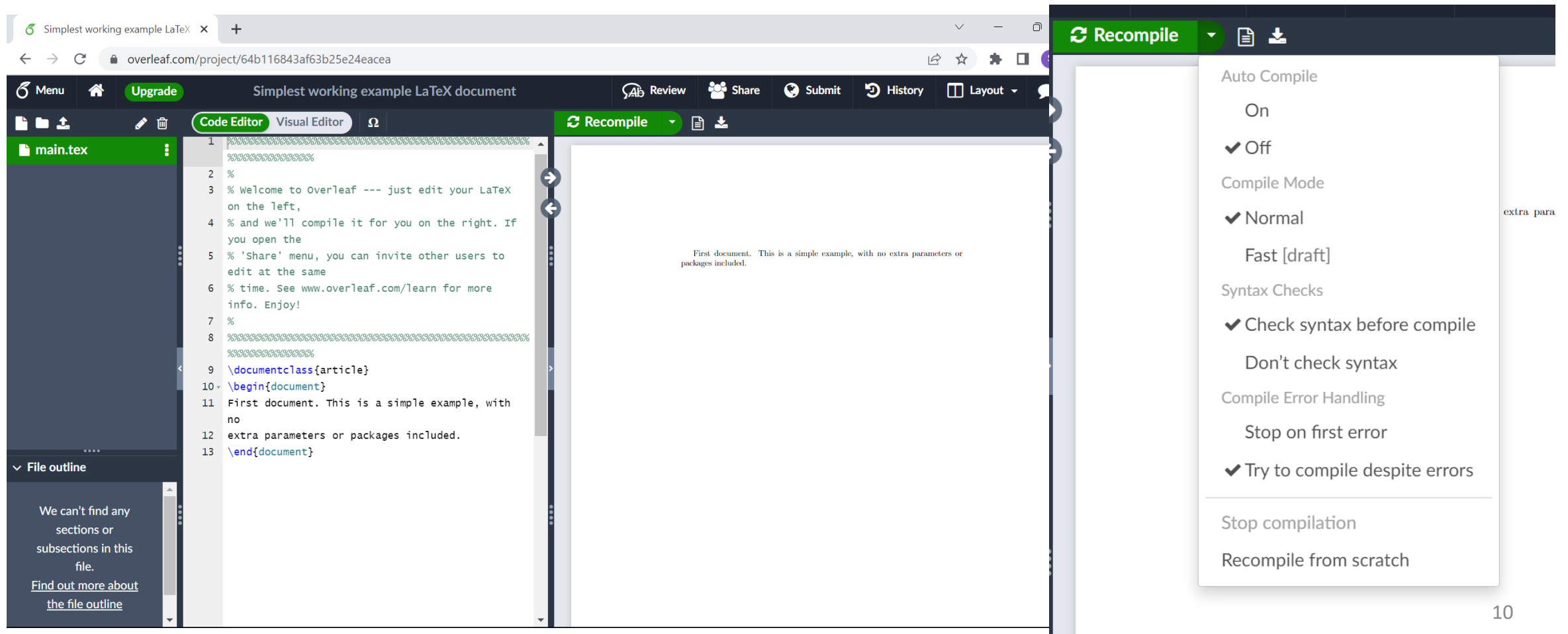
- Starting a document, declare the document type known as its *class*, which controls the overall appearance of the document. You can use `\documentclass{enterclassname}`.
- Declare the beginning of the document with `\begin{document}`.
- As in most of the coding languages, remember to ‘end’ all ‘begins’. To end the document, you can use `\end{document}`.

As an example:

```
\documentclass{article}
\begin{document}
Welcome to the tutorial. This is the first document.
\end{document}
```

# Section 3: Creating your first document

- Once you click on **Recompile**, you get to see what your document looks like.
- You can select Auto-Compile if you wish to have your document recompiling as you code.



The screenshot displays the Overleaf web interface for a LaTeX document. The left pane shows the source code in the Code Editor, and the right pane shows the rendered PDF. A dropdown menu is open over the 'Recompile' button, showing options for Auto Compile, Compile Mode, Syntax Checks, and Compile Error Handling.

**Code Editor Content:**

```
1 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
2 %
3 % Welcome to Overleaf --- just edit your LaTeX
4 % on the left,
5 % and we'll compile it for you on the right. If
6 % you open the
7 % 'Share' menu, you can invite other users to
8 % edit at the same
9 % time. See www.overleaf.com/learn for more
10 % info. Enjoy!
11 %
12 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
13 %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
14 \documentclass{article}
15 \begin{document}
16 First document. This is a simple example, with
17 no
18 extra parameters or packages included.
19 \end{document}
```

**Rendered PDF Content:**

First document. This is a simple example, with no extra parameters or packages included.

**Recompile Dropdown Menu Options:**

- Auto Compile
  - On
  - ☒ Off
- Compile Mode
  - ☒ Normal
  - Fast [draft]
- Syntax Checks
  - ☒ Check syntax before compile
  - Don't check syntax
- Compile Error Handling
  - Stop on first error
  - ☒ Try to compile despite errors
- Stop compilation
- Recompile from scratch

# Section 3: Creating your first document

## 3. Preamble

- Everything you write before your `\begin{document}` command is called preamble and determines the **setup of the document**.
- You can use this section to specify fonts, languages, titles, authors, dates and to add packages.

As an example:

```
\documentclass[12pt, letterpaper]{article}
\usepackage{graphicx}
\title{My first LaTeX document}
\author{Sebnem Manolya Demir\thanks{USC Marshall.}}
\date{August 2023}
\begin{document}
\maketitle
We have now added a title, author and date to our first document!

\end{document}
```

# Section 4: Common operations

- **Bold:** `\textbf{...}`
- *Italics:* `\textit{...}`
- Underline: `\underline{...}`
- Comments: `%...`

- (Unordered) Lists:

```
\begin{itemize}
  \item First item.
  \item Second item.
\end{itemize}
```



- First item
- Second item.

- Ordered Lists:

```
\begin{enumerate}
  \item First item.
  \item Second item.
\end{enumerate}
```

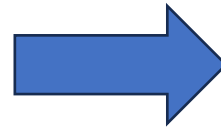


1. First item.
2. Second item.

# Section 4: Common operations

- Nested Lists:

```
\begin{enumerate}
\item This is the first element.
\begin{itemize}
\item This is the sub-element.
\item Another sub-element for the first one.
\end{itemize}
\item This is the second element.
\begin{itemize}
\item This is its only sub-element.
\end{itemize}
\end{enumerate}
```



1. This is the first element.
  - This is the sub-element.
  - Another sub-element for the first one.
2. This is the second element.
  - This is its only sub-element.

# Adding Maths

For mathematical symbols, equations, expressions: **Math Mode**

Include `\usepackage{amsmath}` in the preamble.

## 1. Inline Math Mode

To output: The mass-energy equivalence is  $E = mc^2$ , discovered by Albert Einstein.

Use one of:

- `\( ... \)`
- `$ ... $`
- `\begin{math} ... \end{math}`

As an example: The mass-energy equivalence is  $E=mc^2$ , discovered by Albert Einstein.

```
The mass-energy equivalence is
\begin{math}
E=mc^2,
\end{math}
discovered by Albert Einstein.
```

# Adding Maths

## 2. Display Math Mode

To output: The mass-energy equivalence is expressed as

$$E = mc^2$$

discovered by Albert Einstein.

Use one of:

- `\[ ... \]`
- `\begin{displaymath} ... \end{displaymath}`
- `\begin{equation} ... \end{equation}`

← Labels equations with equation number

As an example:

```
The mass-energy equivalence is expressed as
\begin{equation}
E=mc^2
\end{equation}
discovered by Albert Einstein.
```

# Adding Maths

## Useful to know:

- $\sqrt{x^2+1}$

$$\sqrt{x^2 + 1}$$

- $x^{5n+1}$

$$x^{5n+1}$$

- $x_{\{abc\}}$

$$x_{abc}$$

- $\binom{n}{k} = \frac{n!}{k!(n-k)!}$

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}$$

- $\int_0^1 x^2 + y^2 \, dx$

$$\int_0^1 x^2 + y^2 \, dx$$



# Adding Maths

## Useful to know:

description	code	examples
Greek letters	<code>\alpha \beta \gamma \rho \sigma \delta \epsilon</code>	$\alpha \beta \gamma \rho \sigma \delta \epsilon$
Binary operators	<code>\times \otimes \oplus \cup \cap</code>	$\times \otimes \oplus \cup \cap$
Relation operators	<code>&lt; &gt; \subset \supset \subseteq \supseteq</code>	$< > \subset \supset \subseteq \supseteq$
Others	<code>\int \oint \sum \prod</code>	$\int \oint \sum \prod$

# Adding Maths

## Useful to know:

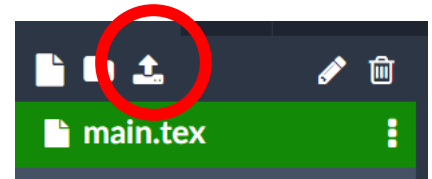
L <sup>A</sup> T <sub>E</sub> X markup	Renders as
<code>a_{n_i}</code>	$a_{n_i}$
<code>\int_{i=1}^n</code>	$\int_{i=1}^n$
<code>\sum_{i=1}^{\infty}</code>	$\sum_{i=1}^{\infty}$
<code>\prod_{i=1}^n</code>	$\prod_{i=1}^n$
<code>\cup_{i=1}^n</code>	$\cup_{i=1}^n$
<code>\cap_{i=1}^n</code>	$\cap_{i=1}^n$
<code>\oint_{i=1}^n</code>	$\oint_{i=1}^n$
<code>\coprod_{i=1}^n</code>	$\coprod_{i=1}^n$

## Spacing in Math Mode:

L <sup>A</sup> T <sub>E</sub> X code	Description
<code>\quad</code>	space equal to the current font size (= 18 <span style="color: green;">mu</span> )
<code>\,</code>	3/18 of <code>\quad</code> (= 3 <span style="color: green;">mu</span> )
<code>\:</code>	4/18 of <code>\quad</code> (= 4 <span style="color: green;">mu</span> )
<code>\;</code>	5/18 of <code>\quad</code> (= 5 <span style="color: green;">mu</span> )
<code>\!</code>	-3/18 of <code>\quad</code> (= -3 <span style="color: green;">mu</span> )
<code>\</code> (space after backslash!)	equivalent of space in normal text
<code>\qquad</code>	twice of <code>\quad</code> (= 36 <span style="color: green;">mu</span> )

# Adding Images

1. Add the image to your Overleaf file by clicking on Upload on upper left and selecting the image.



2. Include `\usepackage{graphicx}` in the preamble.

3. Use:

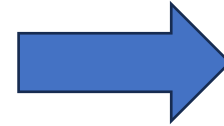
<code>\begin{figure}[h]</code>	← Use [h] or [H] to determine whether you want the image to be strictly in this position in the document
<code>\centering</code>	← Adjust the vertical position of the image
<code>\includegraphics[width=0.75\textwidth]{name_of_your_image}</code>	← Insert your image
<code>\caption{...}</code>	← Add a caption to be displayed under your image
<code>\label{...}</code>	← Add a label to us when referencing it later using <code>\ref{...}</code>
<code>\end{figure}</code>	← Begin and end as always!

# Adding Images

Parameter	Position
<code>h</code>	Place the float <i>here</i> , i.e., <i>approximately</i> at the same point it occurs in the source text (however, not <i>exactly</i> at the spot)
<code>t</code>	Position at the <i>top</i> of the page.
<code>b</code>	Position at the <i>bottom</i> of the page.
<code>p</code>	Put on a special <i>page</i> for floats only.
<code>!</code>	Override internal parameters LaTeX uses for determining "good" float positions.
<code>H</code>	Places the float at precisely the location in the <code>L<sup>A</sup>T<sub>E</sub>X</code> code. Requires the <code>float</code> package. This is somewhat equivalent to <code>h!</code> .

# Adding Tables

```
\begin{table}[h!]  
\centering  
\begin{tabular}{| | c c c c | |}  
\hline  
Col1 & Col2 & Col2 & Col3 \\\ [0.5ex]  
\hline\hline  
1 & 6 & 87837 & 787 \\  
2 & 7 & 78 & 5415 \\  
3 & 545 & 778 & 7507 \\  
4 & 545 & 18744 & 7560 \\  
5 & 88 & 788 & 6344 \\\ [1ex]  
\hline  
\end{tabular}  
\caption{Table example}  
\label{table:data}  
\end{table}
```



Col1	Col2	Col2	Col3
1	6	87837	787
2	7	78	5415
3	545	778	7507
4	545	18744	7560
5	88	788	6344

Table 1: Table example

# Adding Tables

- A more practical way is to use a table generator website for LaTeX, such as <https://www.tablesgenerator.com/>

The screenshot displays the Tablesgenerator.com web application. At the top is a menu bar with 'File', 'Edit', 'Table', 'Column', 'Row', 'Cell', and 'Help'. Below the menu is a toolbar with icons for table manipulation and a 'Default table style' dropdown. The main workspace shows a 3x3 table with columns labeled A, B, and C, and rows labeled 1, 2, and 3. The cell at row 1, column C is highlighted in yellow. To the left of the table is a 'Table caption' section with a text input field containing 'Enter table caption here' and a 'Label' field containing 'tab:my-table'. A 'Generate' button is located below the label. To the right of the table is a 'Result' section with a 'Generate' button and a 'Copy to clipboard' button. The 'Result' section displays the generated LaTeX code for the table, which includes the necessary packages and commands to create a 3x3 table with the specified caption and label. The code is as follows:

```
1 % Please add the following required packages to your document preamble:
2 % \usepackage{graphicx}
3 \begin{table}[]
4 \caption{}
5 \label{tab:my-table}
6 \resizebox{\textwidth}{!}{%
7 \begin{tabular}{lll}
8 & & \\
9 & & \\
10 & & \\
11 \end{tabular}%
12 }
13 \end{table}
```

Below the code, there are three checkboxes: 'Escape special TeX symbols (% , & , \_ , # , \$)' (checked), 'Compress whitespace' (unchecked), and 'Smart output formatting' (unchecked). At the bottom, there is a dropdown menu with the selected option 'Caption above, Scale table to text width'.

# Document Organization

```
\documentclass{article}  
\title{Sections and Chapters}  
\author{Gubert Farnsworth}  
\date{August 2022}  
\begin{document}
```

```
\maketitle
```

```
\tableofcontents
```

```
\section{Introduction}  
\subsection{Intro}
```

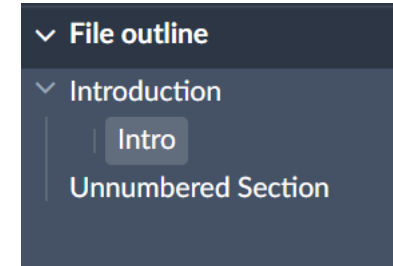
This is the first section.

```
\section*{Unnumbered Section}  
\addcontentsline{toc}{section}{Unnumbered Section}
```

This is the second section.

```
\end{document}
```

Will appear like this on the editor:



Print table of contents on your document.

Add sections and subsections

Use \* to exclude numbers in the section title.

Add the unnumbered section to the table of contents.

# Document Organization

```
\documentclass{article}
\title{Sections and Chapters}
\author{Gubert Farnsworth}
\date{August 2022}
\begin{document}

\maketitle

\tableofcontents

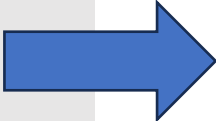
\section{Introduction}
\subsection{Intro}

This is the first section.

\section*{Unnumbered Section}
\addcontentsline{toc}{section}{Unnumbered Section}

This is the second section.

\end{document}
```



Sections and Chapters

Gubert Farnsworth

August 2022

Contents

1

Introduction

1.1 Intro . . . . .

Unnumbered Section

1

1

1

1

1

Introduction

1.1

Intro

This is the first section.

Unnumbered Section

This is the second section.



# References

1. Create a .bib file with the following information about each of the resources you use. 

Indicate whether this resource is an article, book, report, etc.

2. Add this file to your Overleaf Project using the **Upload** button on the right upper corner.
3. Indicate your bibliography style in the preamble with `\bibliographystyle{...}`.
4. Use `\cite{label}` to cite. Make sure to use the label exactly as in the .bib file for each resource. Note that these commands may differ according to your document type or template. Make sure to double check.
5. `\bibliography{... .bib}` will print out the references that are used in the document.
6. If you want to include all resources in your .bib file, use `\nocite{*}`. If you want to include specific ones, use `\nocite{label}`.

```
@article{label,  
  Author = {...},  
  Journal = {...},  
  Publisher = {...},  
  Title = {...},  
  Volume = {...},  
  pages={...},  
  Year = {...}}
```

# Section 5: Beamer

Beamer is a LaTeX class that is used to create presentations.

```
\documentclass{beamer}
%Information to be included in the title page:
\title{...}
\author{...}
\institute{...}
\date{...}

\begin{document}

\frame{\titlepage}

\begin{frame}
\frametitle{...}
Enter your text here
\end{frame}

\end{document}
```

# Title Slide

```
\title[Short title] %optional  
{Long title}
```

```
\subtitle{...}
```

```
\author[short author1, short author2] % (optional, for multiple authors)  
{long author1 \inst{1} \and long author2 \inst{2}}
```

```
\institute[USC] % (optional)  
{  
  \inst{1}%  
  Institution 1  
  \and  
  \inst{2}%  
  Institution 2  
}
```

```
\date[July 2023] % (optional)  
{Jumpstart Program, July 2023}
```

```
\logo{\includegraphics[height=1cm]{logo_name}}
```

# Title Slide

```
\title[Short title] %optional  
{Long title}
```

```
\subtitle{...}
```

```
\author[short author1, short author2] % (optional, for multi  
{long author1 \inst{1} \and long author2 \inst{2}}
```

```
\institute[USC] % (optional)  
{  
  \inst{1}%  
  Institution 1  
  \and  
  \inst{2}%  
  Institution 2  
}
```

```
\date[July 2023] % (optional)  
{Jumpstart Program, July 2023}
```

```
\logo{\includegraphics[height=1cm]{logo_name}}
```

Long title  
...

long author1<sup>1</sup>   long author2<sup>2</sup>

<sup>1</sup>Institution 1  
<sup>2</sup>Institution 2

Jumpstart Program, July 2023

short author1, short author2 (USC)   Short title   July 2023   1 / 8

# Other Slides

```
\begin{frame}  
\frametitle{Table of Contents}  
\tableofcontents  
\end{frame}
```

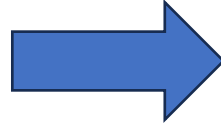


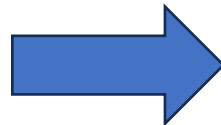
Table of Contents

- 1 First section
- 2 Second section

Navigation icons: back, forward, search, etc.

short author1, short author2 (USC)      Short title      July 2023      2 / 8

```
\begin{frame}  
\frametitle{Sample frame title}  
This is some text in the first frame. This is  
some text in the first frame. This is some  
text in the first frame.  
\end{frame}
```



Sample frame title

This is a text in second frame. For the sake of showing an example.

- Text visible on slide 1

Navigation icons: back, forward, search, etc.

short author1, short author2 (USC)      Short title      July 2023      4 / 8

# Section 6: Posters in LaTeX

- The **beamerposter package** builds on the standard beamer class and the a0poster class, making it possible to create scientific posters using the same syntax as a beamer presentation.
- There is also another commonly used package for posters: **tikzposter**. Although there are fewer themes for **beamerposter** package, and it is slightly less flexible than tikzposter, you may not need to learn many new commands if you are familiar with beamer.

There is a large number of template codes for Beamer Posters. This one can be useful for your end-of-the-program presentations: <https://www.overleaf.com/1323945199gbttqwbxqnnq>

- We will go through the basics of the **beamerposter package**.

# The Preamble

The preamble of a beamerposter is basically that of a beamer presentation, except for an additional command:  
`\usetheme{...}`.

```
\documentclass{beamer}
\usepackage{times}
\usepackage{amsmath,amsthm,amssymb}
\boldmath
\usetheme{...}
\usepackage[orientation=portrait,size=a0,scale=1.4]{beamerposter}

\title[Beamer Poster]{Overleaf example of the beamerposter class}
\author[welcome@overleaf.com]{Overleaf Team}
\institute[Overleaf University]
{The Overleaf institute, Learn faculty}
\date{\today}

\logo{\includegraphics[height=7.5cm]{overleaf-logo}}
```

# The Body

The body is organized with a *frame* and *columns and blocks*.

```
\begin{document}
\begin{frame}{}
\vfll
\begin{block}{\large Fontsizes}
\centering
{\tiny tiny}\par
{\scriptsize scriptsize}\par
{\footnotesize footnotesize}\par
{\normalsize normalsize}\par
...
\end{block}

\end{block}
\vfll
\vfll
```

```
\begin{columns}[t]
\begin{column}{.30\linewidth}
\begin{block}{Introduction}
\begin{itemize}
\item some items
\item some items
...
\end{itemize}
\end{block}
\end{column}
\begin{column}{.48\linewidth}
\begin{block}{Introduction}
\begin{itemize}
\item some items and  $\alpha=\gamma, \sum_i x_i$ 
...
\end{itemize}
 $\alpha=\gamma, \sum_i x_i$ 
\end{block}
...

\end{column}
\end{columns}
\end{frame}
\end{document}
```



# USC Marshall

School of Business

**Thank you for attending!**

# References

- [1] *Learn latex in 30 minutes Overleaf, Online LaTeX Editor*. Available at: [https://www.overleaf.com/learn/latex/Learn\\_LaTeX\\_in\\_30\\_minutes#Bold,\\_italics\\_and\\_underlining](https://www.overleaf.com/learn/latex/Learn_LaTeX_in_30_minutes#Bold,_italics_and_underlining) (Accessed: 17 July 2023).
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