Introduction to LaTeX

What is LaTeX?

- LaTeX is a document preparation system for high-quality typesetting.
- LaTeX is most often used to produce technical or scientific documents, but it can be used for almost any form of publishing.

Why Use LaTeX?

- Designed by academics and easily accommodates academic use.
- Professionally crafted predefined layouts make a document really look as if "printed."
- Mathematical symbols and equations are easily integrated.
- Even complex structures such as footnotes, references, table of contents, and bibliographies can be generated easily.
- Forces author to focus on logical instead of aesthetic structure of a document.
- Creates more beautiful documents.
- Portable, compatible, flexible, versatile, and cheap (or free)!

Installing LaTeX

- **Overleaf** (Online Editor)
  - https://www.overleaf.com

- **In Windows**
- **MiKTeX**
  - MiKTeX is a typesetting system for the Windows.
  - Download from www.miktex.org for free
- **WinEdt**
  - WinEdt is a text editor.
  - Download from www.winedt.com for free for 30 days.

- **In Mac**
- TexShop
  - Download for free http://www.uoregon.edu/~koch/texshop/

Basic Document Structure

- The format of a document is pretty simple.
  - In the preamble
    - Documentclass
    - Packages
  - In the front matter
    - Title/author
  - In the body
    - Contents
  - In the back matter
    - bibliography

In the Preamble

- You specify your document class.
  - Document classes: letter, article, report, book, slides(beamer, prosper)
    - \documentclass[12pt]{article}
    - Backslash – at the beginning of text markup command
  - Packages: numerous packages are available
    - \usepackage[margin=1in]{geometry}
    - \usepackage{setspace}
    - \usepackage{harvard}

```
1  %% Document class and Packages
2  \documentclass[12pt, a4]{article}
3  \usepackage{graphicx} % Required for inserting images
4  \usepackage{amsmath}
5  \renewcommand{\arraystretch}{2} % Stretches rows by 2 times
   the default height
```

In the Front Matter

- \title{}
- \author{}
- \date{}
- \begin{document}
- \begin{abstract}
- \end{abstract}

```
6
7   %% Title and Author
8   \title{ \Large{Orientation Program: Introduction to
    \Large{Latex}} \\
9   \small{\LaTeX}}
10  \author{ \textbf{Team Name} }
11  \date{July 2025}
12
13  %% Document
14  \begin{document}
15  \maketitle
16
17  %% Sections and Subsections
```

In the Body

- To begin a new section
- \section{}
  - Similarly, \subsection{}, \subsubsection{},
  - LaTeX does automatic numbering. If you don't like it, use section*{}
- \emph{}, \textbf{}
- \singlespacing, \doublespacing, \onehalfspacing
- \centering or \begin{centering} & \end{centering}

```
17  %% Sections and Subsections
18  \section{Introduction to Latex}
19  \subsection{What is Latex?}
20  latext  \cite{knuth_1984}
21  \subsubsection{Why latex?}
```

Footnotes/Quotes/Equations

- \footnote{}
- \begin{quote} & \end{quote}
- ` ', `` '' for quatations
- Mathematical Equations
  - Math always in between $ & $
    - Alternatively, \begin{equation} & \end{equation}
  - $ 1+4=5 $
  - \frac{}{}, \sqrt{}, \sum_{k=1}^{n}
  - ^{}, _{}
  - \greek letters (e.g. \alpha or \Alpha)
  - WinEdt also provides click and type functions.

Font Size and Styles

Table 1: Font Size

\Huge{<>}	Font Size is 25pt
\huge{<>}	Font Size is 25pt
\LARGE{<>}	Font Size is 20pt
\Large{<>}	Font Size is 17pt
\large{<>}	Font Size is 14pt
\normalsize{<>}	Font Size is 12pt
\small{<>}	Font Size is 11pt
\footnotesize{<>}	Font Size is 10pt
\scriptsize{<>}	Font Size is 8pt
\tiny{<>}	Font Size is 6pt

Table 2: Font Style

\textmd{<>}	Medium Text 0123
\textbf{<>}	**Bold Text 0123**
\textup{<>}	Upright Text 0123
\textit{<>}	*Italic Text 0123*
\textsl{<>}	*Slanted Text 0123*
\textsc{<>}	Small Caps Text 0123

Mathematical Equations

- Inline equations: Written with $....$
- Equation: Written within \begin{equation} and \end{equation}
- Align: Written within \begin{align} and \end{align}
- Multiline equation: Written within \begin{eqnarray} and \end{eqnarray}

```
\pagebreak{}
\section{Mathematical Equations}
This is an inline equation: $E=mc^2$.
\begin{equation}\label{eq:1}
  a x^2 + b x + c = 0
\end{equation}
% Multiline equation (align)
The roots of the equation\eqref{eq:1} are
\begin{align}   \label{eq:2a}
  x_1 &= \frac{-b + \sqrt{b^2-4ac}}{2a} \\
  \label{eq:2b}
  x_2 &= \frac{-b - \sqrt{b^2-4ac}}{2a}
\end{align}
% Multiline equation (eqnarray - generally not recommended)
Multi-line equation
\begin{eqnarray}
\label{eq:3a}
a x^2 + b x + c = 0\\
  x_1 = \frac{-b + \sqrt{b^2-4ac}}{2a} \\
\label{eq:3b}
x_2 = \frac{-b - \sqrt{b^2-4ac}}{2a}
\label{eq:3b}
\end{eqnarray}
```

4 Mathematical Equations

This is an inline equation: $E = mc^2$.

$$ax^2 + bx + c = 0 \tag{1}$$

The roots of the equation(1) are

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \tag{2}$$

$$x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a} \tag{3}$$

Multi-line equation

$$ax^2 + bx + c = 0 \tag{4}$$

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \tag{5}$$

$$x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a} \tag{6}$$

Numbered(Ordered)and Bulet (Unordered) list

- Enumerate

```
\begin{enumerate}
  \item An ordered item
  \item Another ordered item
  \item And another ordered item
\end{enumerate}
```

⇓

1. An ordered item
2. Another ordered item
3. And another ordered item

- Bullet points/itemization

```
\begin{itemize}
  \item A bulleted item
  \item Another bulleted item
  \item And another bulleted item
\end{itemize}
```

⇓

- A bulleted item
- Another bulleted item
- And another bulleted item

Creating a Table

- Add numbered table
  - \begin{table} \caption{}
  - Creating a table
- Simple tables can be produced by
  - \begin{tabular}[pos]{tablespec}
  - Within the {tablespec} section, one details the number of columns, the alignment, and the number of vertical lines of the table.
    - {lrc}, {|l|r|c}
  - Then type in from left to right, the values for each cell with & in between.
  - Put "\\" at the end of each row, then input another row of values if needed.
  - \hline
  - For STATA users, after downloading the "outtex" package online, one can simply type "outtex" after any estimation and STATA will spit out LaTeX code for the results table presented.

Creating a 2*3 Table

```
\begin{table}[h]
\caption{Courses in Sem-I}
\begin{tabular}{| c| || r|}
    \hline
    \hline
    Course Name & Course Code& Credits\\
    \hline
Programming in C & CSEG1041 & 5 \\ \hline
Linux Lab & CSEG1126 & 2 \\ \hline
\end{tabular}
\end{table}
```

```
\begin{table}[h]
\centering
\caption{Courses in Sem-I}
\begin{tabular}{ |c| l| r|}
    \hline
    \hline
    Course Name & Course Code& Credits\\
    \hline
Programming in C & CSEG1041 & 5 \\ \hline
Linux Lab & CSEG1126 & 2 \\ \hline
\end{tabular}
\end{table}
```

Table 3: Courses in Sem-I

Course Name	Course Code	Credits
Programming in C	CSEG1041	5
Linux Lab	CSEG1126	2

Including Figures (\usepackage{graphicx})

- \begin{figure}

  \includegraphics[scale=1.2]{e.png}

  \includegraphics{width= 0.5]{e.png}

  \includegraphics[width=5cm, height=4cm]{e.png}

  \includegraphics[scale=0.35, angle=45]{e.png}
- \end{figure}

In the Back Matter

- Don't forget bibliography{filename}
  - Make sure that the bibtex file is saved in the same location where the main tex file is saved.
- Don't forget end{document}

```
%% References or Bibliography
\bibliographystyle{IEEEtran}
\bibliography{Ref_Eg}

\end{document}
```

Thank you