Introduction to LaTeX

Beginner's Workshop to Latex and Report Writing

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Outline

1. What is LaTeX?
2. Latex Installation
3. Basic Document Structure
4. Text Formatting
5. Chapters and Sections
6. Equations and Formulas
7. Tables
8. Figures
9. Citations and References
10. Exercise
11. Report Templates

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What is LaTeX?

LaTeX (pronounced “Lah-tech” or “Lay-tech”) is a document preparation system used to create high-quality, structured documents — especially those that include mathematical formulas, figures, tables, and references.

Why Latex?

- High-quality typesetting system
- Widely used in scientific and academic writing
- Ideal for:
  - Mathematical equations
  - Figures and tables
  - References and citations
- Open-source and portable

Advantages of Latex in Report Writing

- Professional and Consistent Formatting
- Perfect for Mathematical and Scientific Writing
- Automatic Numbering and Cross-Referencing
- Powerful Bibliography and Citation Management
- Easy to Include Figures, Tables, and Code
- Automation and Efficiency
- Stable, Portable, and Version-Control Friendly
- Customizable Templates
- High-Quality Output
- Free and Open Source

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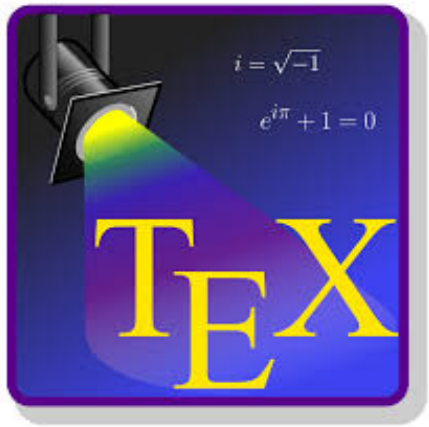
Available Softwares

Overleaf

Best Online Tex editor with a lot of Templates



MikTex & TexStudio

Opensource Offline Latex Compiler and IDE

Steps to Install TexStudio when inside College Network

When installing TexStudio in your personal computers you may directly download the setup from their official website and install it. But inside college laboratory use the below steps.

1. Goto Start menu and Run **PowerShell** as **Administrator**
2. Install **Chocolatey** using following command
   `Set-ExecutionPolicy Bypass -Scope Process ...`
3. Add local chocolatey server
   `choco source add -n nexus-choco ...`
4. Install Textstudio using chocolatey
   `choco install -y miktex texstudio`

Click this Repo for the Commands **Github Repo**

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Basic Document Structure

Code:

```
\documentclass{report}

\begin{document}
Hello, world!
\end{document}
```

Output:
Hello, world!

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Text Formatting Example

Code:

```
\textbf{Bold Text}
\textit{Italic Text}
\underline{Underlined Text}
```

Output:

Bold Text

Italic Text

Underlined Text

Line Breaks Example

Code:

```
This is line one. \\
This is line two. \\[0.5cm]
This is line three.
```

Output:

This is line one.
This is line two.

This is line three.

Paragraphs Example

Code:

```
This is the first paragraph.

This is the second paragraph.
```

Output:

This is the first paragraph.

This is the second paragraph.

Lists Example : itemize

Code:

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

Output:

- First item
- Second item

Lists Example : enumerate

Code:

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

Output:

1. First item
2. Second item

Center Alignment

Code:

```
\begin{center}
This text is centered.
\end{center}
```

Output:

This text is centered.

Left and Right Alignment

Code:

```
\begin{flushleft}
This text is left aligned.
\end{flushleft}

\begin{flushright}
This text is right aligned.
\end{flushright}
```

Output:

This text is left aligned.

This text is right aligned.

Justified Text

Code:

```
\begin{justify}
This text is justified.
It spreads across the full width.
\end{justify}
```

Output:

This text is justified. It spreads across the full width.

Changing Font Sizes

Code:

```
{\tiny Tiny Text}
{\scriptsize Script Size}
{\footnotesize Footnote Size}
{\small Small Text}
{\normalsize Normal Text}
{\large Large Text}
{\Large Larger Text}
{\LARGE Even Larger Text}
{\huge Huge Text}
{\Huge Biggest Text}
```

Output:

Tiny Text

Script Size

Footnote Size

Small Text

Normal Text

Large Text

Larger Text

Even Larger Text

Huge Text

Biggest Text

Different Font Families

Code:

```
\textrm{Roman Family}

\textsf{Sans Serif Family}

\texttt{Typewriter Family}
```

Output:

Roman Family
Sans Serif Family
Typewriter Family

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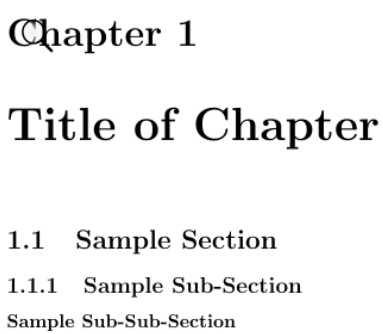
How to Add Chapters & Sections

Code:

```
\chapter{Title of Chapter}
\section{Sample Section}
\subsection{Sample Sub-Section}
\subsubsection{Sample Sub-Sub-Section}
```

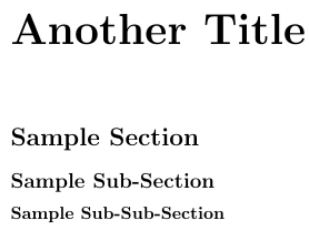
Output:



Code:

```
\chapter*{Another Title}
\section*{Sample Section}
\subsection*{Sample Sub-Section}
\subsubsection*{Sample Sub-Sub-Section}
```

Output:



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Inline vs Block Math

Code:

```
Inline math: $E = mc^2$

Block math:
\[
a^2 + b^2 = c^2
\]
```

Output:

Inline math: $E = mc^2$

Block math:

$$a^2 + b^2 = c^2$$

Numbered Equations

Code:

```
\begin{equation}
F = G \frac{m_1 m_2}{r^2}
\end{equation}
```

Output:

$$F = G\frac{m_1 m_2}{r^2} \tag{1}$$

Labeling and Referring Equations

Code:

```
\begin{equation}
E = mc^2 \label{eq:einstein}
\end{equation}

As seen in equation~\ref{eq:einstein},
energy and mass are related.
```

Output:

$$E = mc^2 \tag{2}$$

As seen in equation 2, energy and mass are related.

Online Tools to Make Latex Equations

- **Site 1** : `https://editor.codecogs.com/`
- **Site 2** : `https://latexeditor.lagrida.com/`
- **Site 3** : Use Overleaf Equation Generator or ChatGPT

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Simple Table

Code:

```
\begin{tabular}{c c}
A & B \\
C & D
\end{tabular}
```

Output:

A	B
C	D

Table with Borders

Code:

```
\begin{tabular}{|c|c|}
\hline
Name & Score \\
\hline
Alice & 95 \\
Bob & 88 \\
\hline
\end{tabular}
```

Output:

Name	Score
Alice	95
Bob	88

Table with Caption and Label

Code:

```
\begin{table}
\centering
\begin{tabular}{|c|c|}
\hline
Country & Capital \\
\hline
India & New Delhi \\
USA & Washington DC \\
\hline
\end{tabular}
\caption{List of Countries}
\label{tab:countries}
\end{table}

See Table~\ref{tab:countries} for details.
```

Output:

Country	Capital
India	New Delhi
USA	Washington DC

Table: List of Countries

See Table 1 for details.

Online Tools to Make Tables

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- **Site 2** : `https://www.latex-tables.com/`
- **Site 3** : Use Overleaf Table Generator or ChatGPT

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Including a Simple Image

Code:

```
\includegraphics{rcoe-logo.png}
```

Output:

Resizing an Image

Code:

```
\includegraphics[width=0.5\textwidth]{rcoe-logo.png}
```

Output:

Image with Caption and Label

Code:

```
\begin{figure}
\centering
\includegraphics[width=0.2\textwidth]{rcoe-logo.png}
\caption{Sample Figure}
\label{fig:sample}
\end{figure}

As shown in Figure~\ref{fig:sample},
this is an example image.
```

Image with Caption and Label: Output

Output:

Figure: Sample Figure

As shown in Figure 1, this is an example image.

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Adding a Citation

Code:

```
According to \cite{einstein},
energy and mass are related.
```

Output:

According to [1], energy and mass are related.

Creating a .bib File

Code in refs.bib:

```
@article{einstein,
  author  = {Albert Einstein},
  title   = {Does the Inertia of a Body Depend Upon Its Energy
  journal = {Annalen der Physik},
  year    = {1905},
}
```

Code in main.tex:

```
\usepackage[backend=biber,style=ieee]{biblatex}  % preamble
\addbibresource{references.bib}

\printbibliography
```

Output of References

Output:

According to [1], energy and mass are related.

References:

Albert Einstein.
Does the Inertia of a Body Depend Upon Its Energy Content?
Annalen der Physik, 1905.

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Hands-on Exercise: Build Your Resume

Task: Create a one-page resume using LaTeX.

Include the following:

- **Name** in large bold font
- **Tagline** (e.g., *"Student — Developer"*)
- **Photo** (insert with `\includegraphics`)
- **Short Bio** (3–4 lines)
- **Education** (table or list with degree, year, institution)
- **Projects** (at least 2 with short description)
- **Skills** (list 5–6 skills)

Bonus: Use alignment, colors, and formatting to make it professional.

Sample

Shiburaj Pappu

Dean of Academics

Bio:

A post graduate in Engineering from Mumbai University, Prof. Shiburaj P. is passionate about innovation & research. For him his work is of prime importance. Being a teacher he likes to guide his students in a proper direction to attain their goals in lives. His students describe him as creative, educated, intelligent, generous, noble & friendly.

Education:

Qualification	College	Year
M.E.	S.P.I.T. Andheri	2013
B.E.	SSPM COE	2008

Projects:

1. **CMSys** : College Management System

Thank You

Questions?

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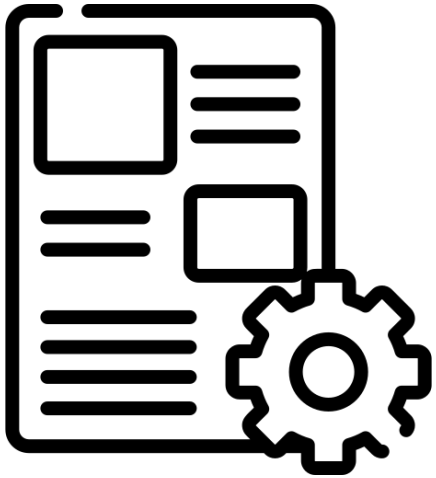
Synopsis Report Template

Use this template for Final year project synopsis report.



Project Report Template

Use this template for Third/Final year project report.