

Institute for the Future of Education | Writing Lab

Basic Formatting Using LaTeX!

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1. Introduction

We have access to various commands and contexts while working with LaTeX, which allows us to format entire content in various ways.

However, before generating the first full document, it is essential to have a solid understanding of the syntax and semantics of the many structures that make up the LaTeX code.

This handout discusses topics such as the LaTeX Document class, adding sections and subsections, text formatting, and creating sorted and unordered lists.

2. Structure of a LaTeX Document

A complete LaTeX document can be typically divided into multiple logical units:

- The first line of the document specifies the document class command that defines the overall structure and formatting of the document.
- The preamble comes after the document class declaration and includes additional packages, defines custom commands, sets document-wide options, and configures the document's appearance.
  - We can include a title, author name, and date in the preamble.

We have already discussed the Preamble in *Why LaTeX?*

2. Structure of a LaTeX Document

- **Then comes the document's body:**
  - It includes the document's content, such as text, equations, tables, figures, and lists.
  - The content is written in plain text and may include LaTeX commands for formatting.
  - LaTeX provides commands for creating sections, subsections, and document structural subsubsections.
- **The end of the document is usually the References section.**
  - LaTeX offers tools for managing references and citations, which allow us to create a bibliography and cite references using commands.

2. Structure of a LaTeX Document

After producing the document, we must use a LaTeX compiler to produce the result (e.g., a PDF).

- Additional runs may be necessary to handle cross-references, citations, and any other issues that may arise throughout the compilation process [1].

Every LaTeX document starts with a \documentclass{} command.

- The document class defines a document's type, overall structure, and default formatting.
- Each document class is for a specific document type, such as articles, reports, books, letters, or presentations.
- Choosing an appropriate document class helps ensure that the document has the appropriate structure and appearance for its intended purpose.
- The document class determines various aspects, including font size, page layout, sectioning commands (e.g., chapters, sections, subsections), headers and footers, table of contents style, and bibliography formatting.
- It also defines specific commands and environments tailored to the document type.

2.1 The Document Class

By selecting a suitable document class, LaTeX automatically applies the predefined settings and formatting rules associated with that class, saving us from manually configuring each aspect.

This lets us focus on the content rather than the document's visual design and layout [2].

Here are some commonly used document classes:

- Article: This class suits articles, papers, and short documents.
- Report: It is suitable for long documents with chapters, such as reports or theses.
- Book: This class is for books with chapters, including front matter (e.g., table of contents, preface).
- Letter: This class accommodates writing letters.
- Beamer: This class is for creating presentations with slides.

For example, as shown in Figure 1, to set the document class to "article", we would use the following: **\documentclass{article}**

```
\documentclass[12pt, a4paper]{article}
\begin{document}
Hi! I am in an article document class with 12pt font and A4 paper
size.
\end{document}
```

Output

Hi! I am in an article document class with 12pt font and A4 paper size.

Figure 1. A LaTeX document class. (Material provided using Overleaf).

2.1 The Document Class

We can often further customize the document class by using suboptions.

- These suboptions allow us to modify specific aspects of the document class to suit our needs better.
- The available suboptions may vary depending on the document class we are using.
- To use suboptions, we would add them in square brackets after the document class declaration.
  - For example: **\documentclass[12pt,a4paper]{report}**
  - This example sets the document class to report with a font size of 12pt and enables A4 paper margins for printing.

A few examples of document classes with commonly used suboptions are shown in the next slide, in table 1.

2.1 The Document Class

S. No.	Document Class	Options	Description
1.	Article class	10pt, 11pt, 12pt	Specifies the font size for the document.
		twocolumn	Formats the document in two columns instead of one.
		titlepage	Prints the title, author, and date on a separate title page.
2.	book class	twoside	Sets the document for two-sided printing, with different margins for odd and even pages.
		openright or openany	Determines whether chapters start on the right (odd) or any page.
		titlepage, notitlepage	Controls whether a separate title page is used.
3.	Report class	fleqn, leqno	flush left equations, left equation numbers
4.	Letter class	letterpaper, a4paper	Sets the paper size for the letter.
		11pt, 12pt	Specifies the font size.
		landscape	Formats the letter in landscape orientation.

Table 1. Document class and commonly used suboptions [3].

2.2 LaTeX Packages

In LaTeX, packages expand the core functionality of the system.

They are collections of commands and settings that allow us to access a wide range of additional features and capabilities unavailable in the core LaTeX system.

They provide solutions for various tasks, including graphics, creating tables, formatting mathematical equations, generating bibliographies, and much more.

This modular approach allows us to tailor LaTeX to our needs, making it a versatile typesetting system.

The predefined commands and settings automate repetitive or intricate formatting procedures.

For example, as shown in Figure 2, the standard syntax of the graphicx package simplifies the inclusion of images in a document.

```
\documentclass[12pt, a4paper]{article}
\usepackage{graphicx} % Package for inserting images in latex
\begin{document}
Hi! I am in an article document class with 12pt font and A4 paper
size. \newline
This is how we refer to figure \ref{fig1}.
\begin{figure}[!hbt]
    \centering
    \includegraphics[width=\columnwidth]{overleaf.png}
    \caption{Official Overleaf logo}
    \label{fig1}
\end{figure}
\end{document}
```

Figure 2. Inclusion of graphicx package in a LaTeX document.

Output

Hi! I am in an article document class with 12pt font and A4 paper size.
This is how we refer to figure 1.



Figure 1: Official Overleaf logo

Figure 2. Inclusion of graphicx package in a LaTeX document. (Material provided using Overleaf).

2.2 LaTeX Packages

Packages required by a document are called in the preamble of the LaTeX document, i.e., before the **\begin{document}** statement.

The syntax to do so is **\usepackage{ }**, with the package's name included in the brackets.

For instance, there are packages like **\usepackage{*beamer*}** for creating presentations, **\usepackage{*tikz*}** for drawing complex diagrams, **\usepackage{*algorithm2e*}** for typesetting algorithms, and **\usepackage{*biblatex*}** for flexible bibliography management.

2.2.1. Float Environment

In LaTeX, **"float"** refers to an environment that handles figures, tables, and other elements that can be move around within a document.

- Floats allow LaTeX to automatically position these elements in the document based on specific rules, such as maintaining the best possible page layout.
- In Figure 2, the figure environment contains the placement specifier [!htb], which suggests to LaTeX where the figure should be positioned.
  - It suggests placing the figure "here (h)," or at the "top(t)" or "bottom(b)" of the page.
  - The ! (override) sign overrides specific internal rules to give LaTeX more flexibility in placing the float.

2.2.1. Float Environment

Using floats, LaTeX can automatically handle the placement of figures and tables, making them appear logically and aesthetically pleasing.

However, it is essential to note that LaTeX may not always place floats exactly where we want them, as it prioritizes maintaining the best possible overall layout of the document [4].

Similarly, a table environment can create floating tables within a LaTeX document.

2.3 Section and Subsection

Documents created in LaTeX always follow a logical structure.

- They can be divided into chapters, sections, subsections, paragraphs, etc. These sectioning and numbering are automatic unless customized manually.
- The **\section{title}** command marks the beginning of a new section called title.
- At the same time, **\subsection{subtitle}** and **\subsubsection{subsubtitle}** is are the maximum depth for sectioning.
- LaTeX can automatically generate a table of contents (TOC) based on the defined sections and subsections [1].

Figure 3 represents the construct for creating sections and subsections in a LaTeX document.

Note that since we have mentioned the font size as 12pt in the document class definition, the document output does not differentiate between a section and a subsection.

However, if the default option is selected, there is a significant difference in the output in font size and sometimes in indentation.

2.3 Section and Subsection

We can have unnumbered sections and subsections as well. We only need to add an asterisk (*) at the end of the command before the opening curly brace.

However, unnumbered sections do not directly add to the table of contents.

So, to add these to the ToC, we need to use the following command:

\addcontentsline{toc}{section}{Title of the section}

2.3 Section and Subsection

```
\documentclass[12pt, a4paper]{article}
\usepackage{graphicx} % Package for inserting images in latex
\begin{document}
\section{Introduction}
Hi! I am in an article document class with 12pt font and A4 paper
size. \newline
This is how we refer to figure \ref{fig1}.
\begin{figure}[!hbt]
    \centering
    \includegraphics[width=\columnwidth]{overleaf.png}
    \caption{Official Overleaf logo}
    \label{fig1}
\end{figure}
\subsection{About \LaTeX{}}
You can see that this is the first subsection of the Section
Introduction and the name of this subsection is About \LaTeX{}.
\end{document}
```

Figure 3. Creating sections and subsections in a LaTeX document.

2.3 Section and Subsection

Output

1 Introduction

Hi! I am in an article document class with 12pt font and A4 paper size.
This is how we refer to figure 1.



Figure 1: Official Overleaf logo

1.1 About LaTeX

You can see that this is the first subsection of the Section Introduction and the name of this subsection is About LaTeX.

- This is an example of an unordered list
- You can observe that I am using itemize keyword

1. This is an example of an ordered list
2. You can observe that I am using enumerate keyword

Figure 3. Creating sections and subsections in a LaTeX document. (Material provided using Overleaf).

LaTeX offers several options for text formatting, which can be done using commands/environments or packages.

After producing the document, we must compile it using a LaTeX compiler to produce the result (e.g., a PDF).

Additional runs may be necessary to handle cross-references, citations, and any other issues that may arise throughout the compilation process.

Table 2 shows various fonts and stylings of LaTeX text.

2.4 Text formatting

S. No.	Font Style/Size	Conversion
1	Bold: \textbf{Hello}	**Hello**
2.	Italic: \textit{Hello}	*Hello*
3.	Typewriter: \texttt{Hello}	Hello
4.	Underline: \underline{Hello}	Hello
5.	Text size: {\tiny Hello}	Hello
6.	Text size: {\small Hello}	Hello
7.	Text size: {\large Hello}	Hello
8.	Text size: {\Large Hello}	Hello
9.	Text size: {\LARGE Hello}	Hello
10.	Text size: {\huge Hello}	Hello
11.	Text size: {\Huge Hello}	Hello

Table 2. Options for text formatting and styling.

Font size can be changed using commands like:

- **\tiny{}, \scriptsize{}, \footnotesize{}, \small{}, \normalsize{}, \large{}, \Large{}, \LARGE{}, \huge{}, or \Huge{}.**

The text can be Underlined using **\underline{}**, whereas the **\sout{}** command is used to strike through the text [5].

The color of the text can also be changed using the xcolor package.

- For example, **\textcolor{red}{}** will displays the enclosed text in red.

Use **\raggedright** or the flushleft environment to align the text to the left, and **\raggedleft** or the flushright environment to align the text to the right.

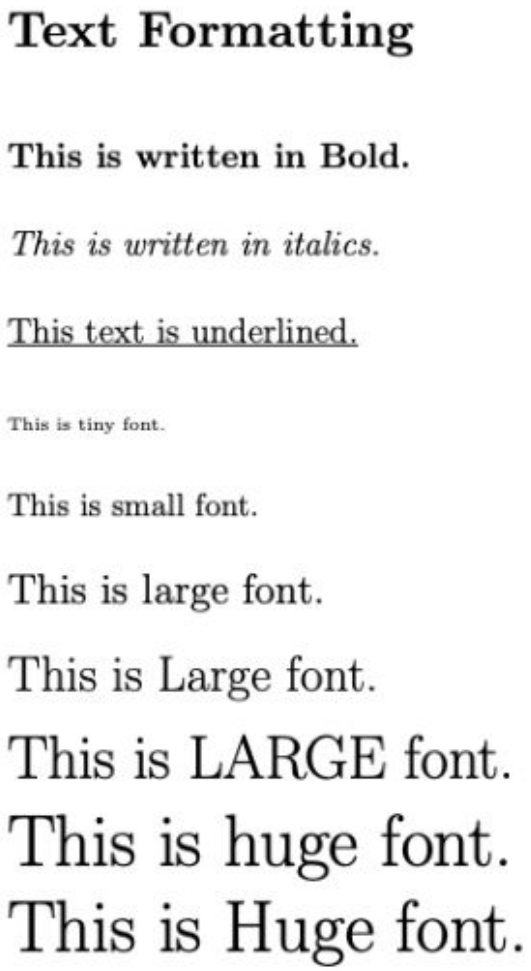
We can use **\centering** or the center environment to center the text.

2.4 Text formatting

```
\documentclass[12pt, a4paper]{article}
\usepackage{graphicx} % Package for inserting images in latex
\begin{document}
\section*{Text Formatting}
\textbf{This is written in Bold.}\\
\textit{This is written in italics.}\\
\underline{This text is underlined.}\\
\tiny{This is tiny font.}\\
\small{This is small font.}\\
\large{This is large font.}\\
\Large{This is Large font.}\\
\LARGE{This is LARGE font.}\\
\huge{This is huge font.}\\
\Huge{This is Huge font.}\\
\end{document}
```

Figure 4. Text formatting and styling commands in a LaTeX document.

Output



Text Formatting

This is written in Bold.

This is written in italics.

This text is underlined.

This is tiny font.

This is small font.

This is large font.

This is Large font.

This is LARGE font.

This is huge font.

This is Huge font.

Figure 4. Text formatting and styling commands in a LaTeX document. (Material provided using Overleaf).

For formatting a paragraph, we use **\setlength{\parindent}{}** to set the indentation of paragraphs.

The setspace package and commands like **\singlespacing, \onehalfspacing,** or **\doublespacing** to adjust the line spacing.

LATEX allows the use of three lists: bulleted list, an ordered list, and a descriptive list.

The term "itemize" refers to the bulleted list format, in which does not require the chronology of the components is not required.

On the other hand, "enumerate" refers to lists that are arranged in order and include numbered items within them [6].

Figure 5 shows how to create ordered, unordered, and descriptive lists using LaTeX.

Bulleted List/Unordered List

- Bulleted lists are lists in which the order of items is irrelevant. The item command can generate an unordered list when working in the itemize environment.

Numbered List/Ordered List

- The This notion is identical to an unordered list, except that the label is a number or letter. The enumerate environment generates an ordered list, adding items using the item command.

Descriptive List

- Unlike itemize and enumerate, a descriptive list, or description, does not have a label.
- Instead, a word or phrase passes to the item as an optional argument.

Nesting lists involves putting one list environment inside another.

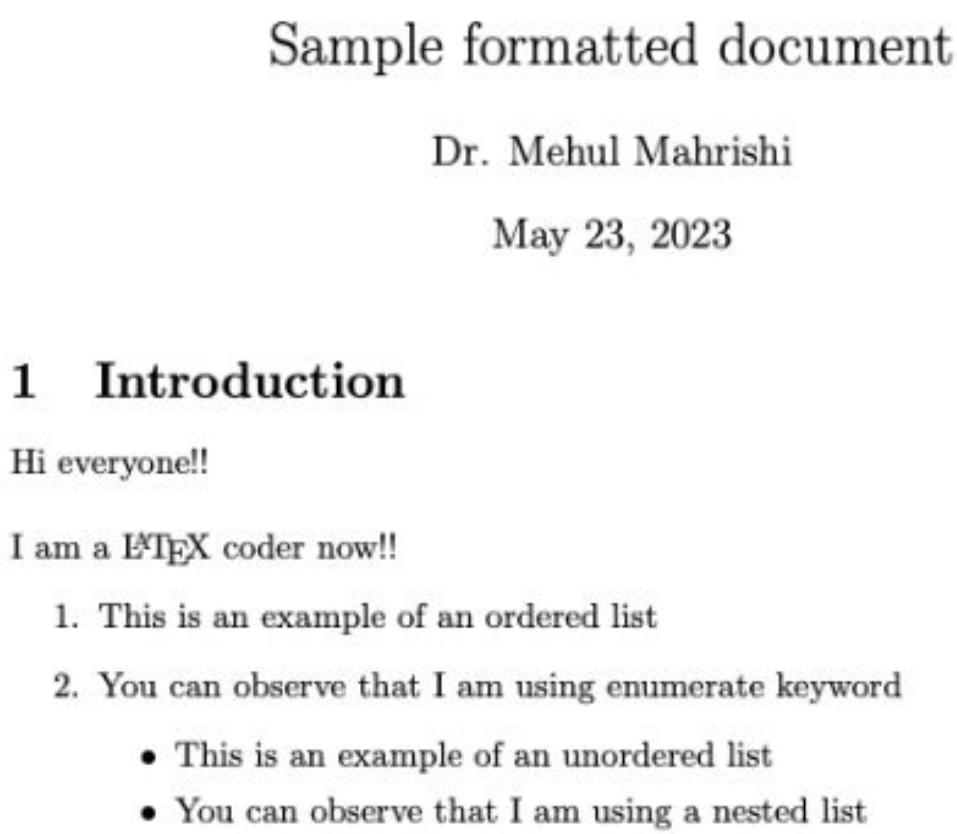
Figure 5 shows how several list types may be merged.

2.5 Creating Lists in LaTex

```
\documentclass{article}
%\usepackage{graphicx} % Required for inserting images
\title{Sample formatted document}
\author{Dr. Mehul Mahrishi}
\begin{document}
  \maketitle
\section{Introduction}
Hi everyone!! \newline \\
I am a \LaTeX{} coder now!!
\begin{enumerate}
    \item This is an example of an ordered list
    \item You can observe that I am using enumerate keyword
    \begin{itemize}
    \item This is an example of an unordered list
    \item You can observe that I am using a nested list
\end{itemize}
\end{enumerate}
\end{document}
```

Figure 5. Creating ordered and unordered lists in a LaTeX document.

Output



Sample formatted document

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1 Introduction

Hi everyone!!

I am a LaTeX coder now!!

1. This is an example of an ordered list
2. You can observe that I am using enumerate keyword
   - This is an example of an unordered list
   - You can observe that I am using a nested list

Figure 5. Creating ordered and unordered lists in a LaTeX document. (Material provided using Overleaf).

Conclusion

This handout defines the simple and basic LaTeX formatting techniques. The example sticks to a documentclass as an "article" and includes the necessary packages such as graphicx. We then set the title and author using **\title, \author** commands, respectively, and generate the title using **\maketitle**. We use **\section** and **\subsection** commands to create section headings. Text formatting uses commands like **\textbf, \textit**, and **\underline.** Lists are created using the itemize and enumerate environments.

Based on this resource, users can select the appropriate documentclass and package to create professional documents.

References

[1] How to use latex. https://guides.lib.wayne.edu/latex/write

[2] A quick guide to using LaTeX by James Calixto. https://jamescalixto.com/quick-guide-latex/

[3] What do "fleqn" and "leqno" stand for? https://latex.org/forum/viewtopic.php?t=9645

[4] Floats in LaTeX. https://tex.stackexchange.com/questions/36252/how-can-i-get-rid-of-the-latex-warning-float-too-large-for-page

[5] LaTeX2e: An unofficial reference manual by Karl Berry, Torsten Martinsen, Stephen Gilmore. https://texdoc.org/serve/latex2e.pdf/0

[6] enumerate— enumerate with redefinable labels. http://ctan.org/pkg/enumerate

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