

\LaTeX for Students, Engineers, and Scientists

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Session: Overview

You will learn...

- What \LaTeX is [1]
- When and why people use it
- What can you do in \LaTeX
- Some sample documents

Overview

- Leslie Lamport
- Document preparation system
- An alternative to text editing software
- Free software
- License: LaTeX Project Public License
- Website: <https://www.latex-project.org/>

What's Different?

what you see is what you get.

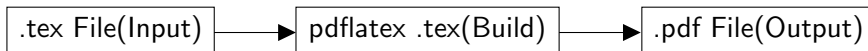
- It is not WYSIWYG
- Concentrate on content and not formatting
- Write simple commands for formatting
- Write content and complex mathematical formulae with ease

What can be done?

- Write articles, books, scientific journals, and papers
- Design posters, banners, resume, etc.
- Mostly used by writers and engineers

Process of Writing

- Write content using any text editor:
 - notepad
 - gedit
 - \LaTeX IDEs
- Save it as .tex
- Build
- Output: pdf file



Sample Documents

Show documents

Thank you



References I

- [1] “Latex.” <https://en.wikipedia.org/wiki/LaTeX>, July 2019.
[Online; accessed 22-July-2019].

L^AT_EX for Students, Engineers, and Scientists

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Session: Install L^AT_EX

You will learn...

- To install \LaTeX
- Get introduced to different IDEs
- Get introduced Web based editors

Installation (Windows)

- Download miktex
- <https://miktex.org/download>

Installation (Ubuntu)

- `sudo apt-get install texlive-full`

L^AT_EX IDEs

- Texstudio
<https://www.texstudio.org/>
- Kile
<https://kile.sourceforge.io/>
- TeXworks
<http://www.tug.org/texworks/>

offline editors

Web based Editors

- Overleaf
<https://www.overleaf.com/>
- LaTeX Base
<https://latexbase.com/>
- Papeeria
<https://papeeria.com/>
- Authorea
<https://www.authorea.com/>

Editor Features

- Auto complete of LaTeX commands
- Parenthesis matching
- Collapsible sections
- Inverse search
- No. of collaborators
- Public project
- Private project
- Track changes
- History
- Comments

Thank you



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Session: Create First \LaTeX Document

You will learn to ...

- Define document class
- Provide document information
- Create your first \LaTeX document

Document class

report book are some other classes.

- Type of document
- Use of appropriate class
- Syntax

```
\documentclass{article}
```

Document Information

- Title

```
\title{Creating first document in \LaTeX}
```

- Author

```
\author{Firuza}
```

- Date

```
\date{\today}
```

Document

- Write content

```
\begin{document}  
  content...  
\end{document}
```



Demo

All in One

```
\documentclass{article}

\title{Creating first document in \LaTeX}
\author{Firuza}
\date{\today}


\begin{document}
    My first document
\end{document}
```

maketitle

```
\maketitle
```


Now, you can ...

- create a basic \LaTeX document
- build and view it

Thank you



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Session: Defining Sections

You will learn to ...

- Organize the content into different sections
- Insert Table of Contents

Recapitulate document class

- Document class
 - article
 - book
 - report
- `\documentclass{article}`

Sections

- Divide/Classify content in document
- Associated with document class
- Has a level number

Section Levels

- 1. `\part{...}`: article, report, book
- 0. `\chapter{...}`: report, book
- 1. `\section{...}`
- 2. `\subsection{...}`
- 3. `\subsubsection{...}`
- 4. `\paragraph{...}`
- 5. `\subparagraph{...}`

Note: 1 to 5 in all document classes



Demo

Table of Contents

- `\tableofcontents`
- Display alias
 - `\section[alias]{...}`

THE LONG NAME NEED NOT
TO BE DISPLAYED IN THE
TABLE OF CONTENTS.(ACRONYM IS ENOUGH)

% sign for adding comments.

if we type
`\author{HARI`
`PRAKASH}`



Demo

it wont be in next line.
for adding hari it on next line the
command is `\`

need to be as `\author{HARI \ PRAKASH}`

Now, you can ...

- Organize content by creating sections
- Insert table of contents

Thank you



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Session: Recapitulate Topic 1

Recapitulate Session 1

- What is \LaTeX ?
- Why is it used?
- Generate pdf from .tex

Recapitulate Session 2

- Installed \LaTeX
- \LaTeX IDEs: Texstudio, Kile
- Web Editors: Overleaf, Papeeria

Recapitulate Session 3

```
\documentclass{article}

\title{Creating first document in \LaTeX}
\author{Firuza}
\date{\today}


\begin{document}
    My first document
\end{document}
```

Recapitulate Session 4

- Sections and its use in appropriate class
- `\tableofcontents`



Thank you

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Session: Paper Size and Margin

You will learn to ...

- Use packages
- Define different paper sizes
- Set margins



COMMAND VS ENVIRONMENT



CLASS VS PACKAGE

Using Packages

- File containing extra \LaTeX commands
- .sty file
- Styling, new features
- `\usepackage[Parameters]{PackageName}`
- Mentioned before document begins

Paper Size

- A series: A0, A1, A2, A3, A4, ...
- B series: B0, B1, B2, B3, B4, ...
- https://en.wikipedia.org/wiki/Paper_size
- `\usepackage[a5paper]{geometry}`

Margins

- left, right, top, bottom
- `\usepackage[margin=1.5in]{geometry}`



Demo

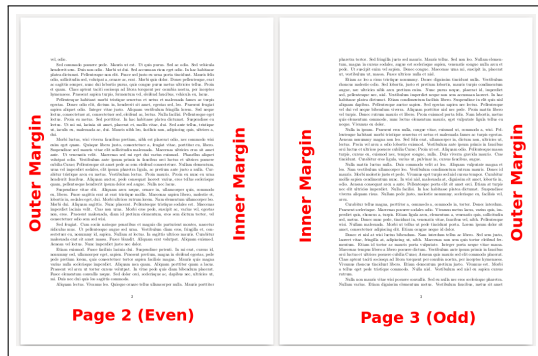
Margins (Single Side document)

in-inch

- Different margins
- `\usepackage[top=1in, bottom=0.75in, left=1.25in, right=1.1in] {geometry}`

Margins (Two Side document)

- Print on both sides: Book, 2 sided article
- `\usepackage[inner=1.5in, outer=0.5in]{geometry}`



Now, you can ...

- Use a package in \LaTeX
- Mention size of the paper
- Set margins for single side and two side document

Thank you



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Session: Page Style

You will learn to ...

article class shows the page no in the footer, while the book places the pg no in the footer, where the chapter begins and then in the header

- Customize headers and footers
- Change page numbering style
- Reset page number

Page Style

- Displays header and footer
- Styles
 - empty: No header nor footer
 - plain: Footer contains the page number
 - headings: Header contains section name and page number — pg no at top
- Entire Document
`\pagestyle{<style>}`
- Current Page
`\thispagestyle{<style>}`



Demo

Reset Page Number

`\setcounter{page}{1}` = the 1 st chapter has the page no 1

- `\setcounter{page}{<Number>}` reset the page no



Demo

Page Numbering Style

- arabic: 1, 2, 3, ...
- roman: i, ii, iii, ...
- Roman: I, II, III, ..
- alph: a, b, c, ..
- Alph: A,B, C, ...
- `\pagenumbering{<style>}`



Demo

Now, you can ...

- Customize header and footer
- Reset page numbering
- Customize page numbering style

Thank you



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Session: More on Page Formatting

You will learn to ...

- Set orientation
- Add page breaks
- Set footnotes

Orientation

- Direction of the document
- Portrait (vertical) — default
- Landscape (horizontal)

Landscape - Entire Document

landscape is very useful when the tables are used which require more horizontal space than vertical space.

- `\usepackage[landscape]{geometry}`



Demo

Specific Part

- Package
 - `\usepackage{lscape}`
Rotates content by 90 degrees
 - `\usepackage{pdflscape}`
Rotates page by 90 degrees
- `\begin{landscape}`
- `\end{landscape}`
- Note the difference



lipsum-just a placeholder which people use for filling up the document,some random text.

`\lipsum[1-10]` - means generate 1 to 10 paragraphs.



Demo

Page Breaks

`\usepackage{pdfscape}` - for having content in portrait mode but page in the landscape mode.

- `\pagebreak` — sometimes we want our content need to be displayed in the next page thats why pagebreak.
- `\newpage`
same as pagebreak



Demo

Footnotes

- More information about the content
- Written at the bottom
- `\footnote{text to be displayed as footnote}`

footnote will be in the bottom of the bottom margin but the text that we created footnote will be in the paragraph.



Demo

Now, you can ...

- Change orientation of page/document
- Add page breaks
- Set footnotes

Thank you



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Session: Multi-Column Document

You will learn to ...

- Format your document into 2/multicolumns

Overview

- Seen one column document
- 2 columns
 - Research papers
 - Books
- Multi columns
 - Magazines
 - Newspapers

Two Columns

for multiple columns we need to use a package.

- `\documentclass[twocolumn]{...}`



Demo

Multi Columns

- Package: multicol
- Syntax

```
\begin{multicols}{<No.ofColumns>}
```

...

```
\end{multicols}
```

we can also add some bw each column.



Demo

Formatting Multicolumns

without columnbreak
with columnbreak

- Column Spacing
 - Spacing between the columns
 - `\setlength{\columnsep}{<X>pt}`
- Column Separator
 - Dividing columns with a line
 - `\setlength{\columnseprule}{<X>pt }`
- Column Break
 - Force text into next column
 - `\columnbreak`

if we type a poem we need the lines of the stanzas must be in their respective stanzas. for that we can use this.



Now, you can ...

- Format your document into 2 column layout or multi columns

Thank you



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Session: Reading Error Messages

You will learn to ...

- Read and solve errors

Overview

- Building .tex file
- Displays error message if any issue
- Missing or mismatch in curly brace
- Environment not ended
- Package not included,
- Style file not found

Structure of Error Message

- Structure
 - ! <Error message>
 - l.<Line number>

Undefined control sequence

- Chapter in an article

```
\documentclass{article}  
\begin{document}  
\chapter{title}
```

Undefined control sequence

- Chapter in an article

```
\documentclass{article}  
\begin{document}  
\chapter{title}
```

- Error Message

```
Undefined control sequence. \chapter
```


Package not included

- lscap package not written

```
\begin{landscape}
```

```
...
```

```
\end{landscape}
```

- Error Message

```
! LaTeX Error: Environment landscape undefined.
```

```
...
```

Style file not found

- \LaTeX
`\usepackage{lscapes}` instead of `\usepackage{lscap}`
- Error Message
! LaTeX Error: File 'lscapes.sty' not found.
...

Missing or mismatch in curly brace

- \LaTeX

```
\begin{landscape  
hello  
\end{landscape}
```

- Error Message

Runaway argument?

```
{landscape
```

```
! Paragraph ended before \begin was complete.
```

Environment not ended or mismatch

- \LaTeX

```
\begin{landscape}
```

```
...
```

```
\end{multicols}
```

- Error Message

```
\begin{landscape} on input line 6 ended by \end{multicols}.
```

Now, you can ...

- Read error messages and resolve them

Thank you



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Session: Recapitulate Topic 2

Recapitulate Session 6

- Reviewed paper sizes and used them
- Included packages
- Set margins

Recapitulate Session 7

- Customized headers and footers
- Formatted the page numbering style
- Rest page numbers

Recapitulate Session 8

- Worked with portrait and landscape orientation
- Added page breaks
- Inserted foot notes in the document

Recapitulate Session 9

- Created a 2 column / multi column document
- Tweaked the spacing and dividing line of the columns

Recapitulate Session 10

- Understood and resolved error messages
- Undefined control sequence
- Package not included
- Style file not found
- Missing or mismatch in curly brace
- Environment not ended or mismatch

Thank you



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Session: Formatting Text

You will learn to ...

- Increase/decrease font size
- Use different font styles

Font Style

<code>\textbf{ ... }</code>	Text
<code>\textit{ ... }</code>	<i>Text</i>
<code>\emph{ ... }</code>	<i>Text</i>
<code>\underline{ ... }</code>	<u>Text</u>
<code>\textsc{ ... }</code>	TEXT
<code>\textrm{ ... }</code>	Text
<code>\textsf{ ... }</code>	Text
<code>\texttt{ ... }</code>	Text
<code> ... </code>	Text ^{text}
<code>\textsubscript{ ... }</code>	Text _{text}

Font Size

`\tiny`

The smallest font

for defining a font size one must open the curly brace as
`{\tiny content }` then close.

`\scriptsize`

Font size for scripts

`\footnotesize`

Footnote font size

when we are creating paragraphs using lipsum we will
get the paragraphs in random font style.

`\small`

Small font size

`\normalsize`

The default font size

`\large`

large font size

`\Large`

Large font size

`\LARGE`

LARGE font size

`\huge`

huge font size

`\Huge`

The largest font size

Now, you can ...

- Change the font size
- Use different font styles

Thank you



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Session: Coloring Text

You will learn to ...

- Assign a color to your text
- Assign a color to your page

Overview

- Basic Colors
 - red
 - blue
 - green
 - white
 - yellow, etc
 - Package: color
- More Colors
 - Package: xolor
 - Parameter: dvipsnames
- <https://en.wikibooks.org/wiki/LaTeX/Colors>

Text Color

- Single Color

```
\textcolor{blue}{Text}
```

My text is colored blue

- Mixing with White

```
\textcolor{red!70}{Text}
```

A mixture of 70% red and 30% white

- Mixture of 2 colors

```
\textcolor{red!70!blue}{}{}
```

Mixture of red and blue



Demo

Page Color

- `\pagecolor{yellow}`

Now, you can ...

- Color text using a single color
- Color text by mixing white or two colors
- Add a background color to the page

Thank you



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Session: Align Text

You will learn to ...

- Align your text (left, right, center)

Alignment for particular sequence

(both left and right part are aligned)

- Default: Justify that is it is left and right align it.

- Left Align

```
\begin{flushleft} ... \end{flushleft}
```

align means the starting line of a paragraph will start from the same position.

- Center Align

```
\begin{center} ... \end{center}
```

- Right Align

```
\begin{flushright} ... \end{flushright}
```



Demo

Large text

- Left Align
`\flushleft`
- Center Align
`\centering`
- Right Align
`\flushright`

ragged2e

- Package: ragged2e
- Switch back: `\justify` ——— default alignment mode.

Now, you can ...

- Align only certain part of the document
- Align entire document and switch between the alignments

Thank you



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Session: Spacing

You will learn to ...

- add single, one and a half, and double line spacing
- insert vertical and horizontal spacing

Fixed Spacing

- Package: setspace
- Entire document
 - `\singlespacing` — default
 - `\onehalfspacing`
 - `\doublespacing`
- Certain part (for particular part alone)

```
\begin{singlespace | onehalfspace | doublespace}  
...  
\end{...}
```

double spacing is generally used by proof readers because it will be used to mark the proofs.



Demo

Vertical Spacing

- `\vspace{Xpt}`
- `\smallskip`
- `\medskip`
- `\bigskip`
- `\vfill` — extreme equally spacing. used for placing banners or posters and also in the title page.



Demo

Horizontal Spacing

generally used while typy setting mathematics

- `\`
- `\,`
- `\hspace{Xpt}`
- `\hfill`

refer spacing

when we use

eg

`\hari prakash`

the output will be hariprakash without space.

hence we can use `\` for single spacing `\,` for some extra spacing and `\hfill` for extreme spacing.



Demo

Now, you can ...

- assign single, one and a half, and double line spacing to entire or a part of the document
- insert vertical and horizontal spacing
- fill up the vertical and horizontal space

Thank you



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Session: Bullets and Numbering

You will learn to ...

- create ordered list
- create unordered list
- create description list
- change the bullet style
- change the numbering

Unordered List

each item represents a point in the list.

- Bulleted list (no number no order - any item can hold any position)

```
\begin{itemize}
  \item Mouse
  \item Keyboard
  \item Monitor
\end{itemize}
```

Ordered List

- Numbered list (each item has a separate position (numerical or some other like arabic roman etc))

```
\begin{enumerate}  
  \item Red  
  \item Blue  
  \item Green  
\end{enumerate}
```

Description

- Labeled list

```
\begin{description}  
  \item [Input Devices]: mouse, keyboard  
  \item [Output Devices]: monitor, printer  
\end{description}
```



Nested List

- List inside another list
- Combination of un-ordered and ordered

```
\begin{itemize}
  \item Input devices
  \begin{enumerate}
    \item keyboard
  \end{enumerate}
  \item Output devices
  \begin{itemize}
    \item printer
  \end{itemize}
\end{itemize}
```

Change numbering in Enumerate

- Package: enumerate
- Style: (i, ii, ...), (I, II, ...), (a, b, ...), (A, B, ...), (1, 2, ...)
- Syntax

```
\begin{enumerate}<Style>
```

- Example

```
\begin{enumerate}[(A)]
```



Demo

- Package: amssymb
- Style:
`\blacksquare`, `\square`, `\bullet`, `\cdot`, `\diamond`, `-`, `*`, `\circ`
- Level: i, ii, iii, iv ——— NESTED LISTS
- Command
`\renewcommand{\labelitem<Level>}{${<Style>$}`
- Example
`\renewcommand\labelitemiv{${\diamond$}`

[Demo]

Now, you can ...

- create ordered, unordered, and description list
- create a nested list
- use different bullet styles in unordered list
- use different numbering in ordered list

Thank you



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Session: Mathematics - I

You will learn to ...

- Typeset simple mathematical expressions and fractions

Overview

- Simple Maths: No expressions
- Complex ones: `amsmath` or `mathtools`
- Written in between: `$... $` or `\[... \]`

Simple Maths

- $2^2 + 2^2 = 4$

$$\$2^2 + 2^2 = 8\$$$



OUTPUT: $A \cup B = \{X \in A \text{ or } X \in B\}$

for space we need to input `\text` before `A`.

- $\sqrt[4]{4096} = 8$

$$\$\sqrt[4]{4096} = 8\$$$

$A \cup B = \{x \in A \text{ or } x \in B\}$

`\` for space.

- $e^{x+iy} = e^x(\cos y + i \sin y)$

$$\$e^{x+iy} = e^x(\cos y + i \sin y)\$$$

- $A \cup B = n(A) + n(B) - n(A \cap B)$

$$\$A \cup B = n(A) + n(B) - n(A \cap B)\$$$

Symbols

- The Comprehensive LaTeX Symbol List.
<http://tug.ctan.org/info/symbols/comprehensive/symbols-a4.pdf>
- Finding unknown symbol
<http://detexify.kirelabs.org/classify.html>

Fractions

- $\frac{\text{numerator}}{\text{denominator}}$
- $\frac{2}{3}$ $\frac{\text{2}}{\text{3}}$
- $\frac{8}{\frac{1}{3}} = 8 \times \frac{3}{1}$
 $\frac{8}{\frac{1}{3}} = 8 \times \frac{3}{1}$
- $\frac{a}{b} \geq \frac{c}{d}$
 $\frac{a}{b} \geq \frac{c}{d}$
- $\frac{\sqrt{x+2}}{x^2-3}$
 $\frac{\sqrt{x+2}}{x^2-3}$

Variable Size of Braces

() - bigg

{ } - Bigg

- Sizes + braces: () or {} or []

- `\Bigg \bigg \Big \big`

- $\left[\left\{ (3+2)/5 \right\} \times 6 \right]$

`$ \bigg[\Big\{ \big(3+2\big) / 5 \Big\} \times 6 \bigg] $`

- $\left\{ \left(\frac{8}{4} \right) + \left(\frac{3}{4} \right) \right\}$

`$\bigg\{ \Big(\frac{8}{4}\Big) + \Big(\frac{3}{4}\Big) \bigg\}$`

Summation

- Syntax

`\sum_{min}^{max}`

- $$\sum_{i=a}^b g(i) = 0, \text{ for } b < a.$$

`\[\sum_{i=a}^{b} g(i)=0, \text{for } b < a. \]`

- $$\sum_{i=1}^n i = \frac{n(n+1)}{2}$$

`\[\sum_{i=1}^n i = \frac{n(n+1)}{2} \]`

Now, you can ...

- Typeset simple mathematical expressions
- Search symbols and commands
- Typeset fractions and summation
- Adjust the size of the braces

Thank you



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Session: Mathematics - II

You will learn to ...

- Integration
- Matrices
- Equations

Integration and Limits

- Integration

$$\int_{\min}^{\max}$$

- Limits

$$\lim_{\dots}$$

- $\int_0^{\infty} f(x) dx$

$$\int_0^{\infty} f(x) dx$$

- $\lim_{x \rightarrow c} f(x) = L$

$$\lim_{x \rightarrow c} f(x) = L$$

Matrix

- $\$ \begin{...}$
 \dots
 $\end{...} \$$
- matrix: without border
- pmatrix: with round bracket
- bmatrix: with box bracket
- Bmatrix: with curly bracket
- vmatrix: with |
- Vmatrix with ||
- & denotes the new column
- \\denotes a new row

Equation

- `\begin{equation}`

one equation per environment

...

`\end{equation}`

- Centered and numbered. No need of dollar
- Only one equation
- Examples

$$3x + 5y = 2 \quad (1)$$

$$5x + 8y = 3 \quad (2)$$

$$x^2 - y^2 = (x + y)(x - y) \quad (3)$$

Align Environment

ref equ.tex

- Solve the equation
- Equation on multiple lines

`\begin{align}`

for not considering the steps
as equations since they are just the
steps, we need to use

`\nonumber` at the end

$$3x - 6 = 9$$

$$3x = 9 + 6$$

$$x = \frac{9 + 6}{3}$$

$$x = 5$$

if we want them align by equ symbol we can
add as on each line

$$3x - 6 \&= 9$$

(4)

Now, you can ...

- Typeset
 - Integration
 - Limits
 - Marices
 - Equations

Thank you



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Session: Recapitulate Topic 3

Recapitulate Session 12

- Font styles: `\textbf`, `\emph`, etc.
- Font sizes: `\large`, `\huge`, etc.

Recapitulate Session 13

- Basic colors: `color`
- More colors: `xcolor`, `dvipsnames`
- `\textcolor...text`
- Mix colors: `!`
- `\pagecolor`

Recapitulate Session 14

- left, center, right
- flushleft, flushright, center, centering
- justify (ragged2e)

Recapitulate Session 15

- `setspace`
- Commands: `singlespacing`, `onehalfspacing`, `doublespacing`
- Environment: `singlespace`, `onehalfspace`, `doublespace`
- vertical and horizontal spacing

Recapitulate Session 16

- ordered and unordered list
- itemize, enumerate, description

Recapitulate Session 17

- Basic maths
- Finding unknown symbols
- Fractions
- Vary the size of braces
- Summation

Recapitulate Session 18

- Integration
- Limits
- Matrix
- Equations
- Equations spanning multiple lines

Thank you



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Session: Creating Tables

You will learn to ...

- Create a table using tabular environment
- Align contents of column
- Specify column width

Overview

- Tabular environment
- `\begin{tabular}{cols}`
 ...
 `\end{tabular}`
- cols
 - l
 - r
 - c
 - `p{Xcm}`: left align
- Column: `&`
- Row: `\\`

Basic Table

No.	Item	Price
1	Pen	10
2	Pencil	5

clr

c - centre which is the first column

l - left column

r - right column

alignment

```
\begin{tabular}{clr}
  No. & Item & Price \\
  1 & Pen & 10 \\
  2 & Pencil & 5 \\
\end{tabular}
```

c - center align



Demo

Column width

No.	Item	Price
1	Pen	10
2	Pencil	5

```
\begin{tabular}{p{1cm}p{3cm}p{2cm}}  
  No. & Item & Price \\  
  1 & Pen & 10 \\  
  2 & Pencil & 5 \\  
\end{tabular}
```



Demo

Now, you can ...

- Use tabular environment
- Create a basic table
- Align contents of columns
- Specify width of a column

Thank you



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Session: Table Borders

Recapitulate

No.	Item	Price
1	Pen	10
2	Pencil	5

```
\begin{tabular}{clr}  
  No. & Item & Price \\  
  1 & Pen & 10 \\  
  2 & Pencil & 5 \\  
\end{tabular}
```

You will learn to ...

- Add simple borders to the table
- Add dashed borders to the table

Overview



- Vertical: |  in environment
- Horizontal: `\hline`  at each row
- Specific: `\cline{i-j}`

Table with Border

No.	Item	Quantity	Price
1	Pen	3	10
2	Pencil	3	5

if we dont want this particular cell we can use

`\cline`

to draw a direct line bw item and price without that vertical line in between.

```
\begin{tabular}{|c|l|l|r|}
\hline
No. & Item & Quantity & Price \\
\hline
1 & Pen & 3 & 10 \\
\hline
2 & Pencil & 3 & 5 \\
\hline
\end{tabular}
```

cline can be used to draw horizontal lines at particular cells.

cline

No.	Item	Quantity	Price
1	Pen	3	10
2	Pencil		5

```

\begin{tabular}{|c|l|l|r|}
  \hline
  No. & Item & Quantity & Price \\
  \hline
  1 & Pen & 3 & 10 \\
  \cline{1-2}\cline{4-4}
  2 & Pencil & & 5 \\
  \hline
\end{tabular}

```

Dashed Borders

- Package: `arydshln`
- Vertical: `:`
- Horizontal: `\hdashline[size of dash / space between dashes]`
- Specific: `\cdashline {i-j}[size of dash / space between dashes]`
- Example
 - `\hdashline[1pt/2pt]`
 - `\cdashline{2-3}[1pt/2pt]`

Example: Dashed borders

No.	Item	Quantity	Price
1	Pen	3	10
2	Pencil		5

```

\begin{tabular}{:c:l:l:r:}
  \hdashline[3pt/5pt]
  No. & Item & Quantity & Price \\
  \hdashline[3pt/5pt]
  1 & Pen & 3 & 10 \\
  \cdashline{1-2}[3pt/5pt]
  \cdashline{4-4}[3pt/5pt]
  2 & Pencil & & 5 \\
  \hdashline[3pt/5pt]
\end{tabular}

```

Now, you can ...

- Add plain border to the table
- Add dashed border to the table

Thank you



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Session: Merging Rows and Columns

You will learn to ...

- Merge rows and columns
- Spacing tables

Recall cline

No.	Item	Quantity	Price
1	Pen	3	10
2	Pencil		5

```
\begin{tabular}{|c|l|l|r|}
\hline
No. & Item & Quantity & Price \\
\hline
1 & Pen & 3 & 10 \\
\cline{1-2}\cline{4-4}
2 & Pencil & & 5 \\
\hline
\end{tabular}
```

Merge Rows

- Package: multirow
- Syntax: `\multirow {NumberOfRows}{Width}{...}`

Merge Rows

No.	Item	Quantity	Price
1	Pen	3	10
2	Pencil		5

common to two rows(merged)

* used to denote the contents natural width.

```
\begin{tabular}{|c|l|l|r|}
\hline
No. & Item & Quantity & Price \\
\hline
1 & Pen & \multirow{2}{*}{3} & 10 \\
...

```



Demo

Merge Columns

- `\multicolumn{TotalColumns}{Alignment}{...}`

Stationery Items			
No.	Item	Quantity	Price

```
\begin{tabular}{|c|l|l|r|}
\hline
\multicolumn{4}{|c|}{Stationery Items} \\
\hline
No. & Item & Quantity & Price \\
...
```



Demo

Spacing

- `\renewcommand{\arraystretch}{value}` ——— for vertical spacing of the merged row
- Default value: 1
- Before tabular environment

Stationery Items			
No.	Item	Quantity	Price
1	Pen	3	10

```
\renewcommand{\arraystretch}{1.5}
\begin{tabular}{|c|l|l|r|}
...
```

Now, you can ...

- Merge rows
- Merge columns
- Space out text in the table

Thank you



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Session: Saviour for Large Tables

Recapitulate the Exercise

since due to large amount of contents it may cause overflow so we cant able to see it.

we can use the longtable.

- A large table
- Content not getting displayed
- Limitation: Manually split data

You will learn to ...

- Handle large data in a table

Long Tables

- Package: longtable
- Environment

```
\begin{longtable}{columns}
```

```
...
```

```
\end{longtable}
```



Demo

Repeat Heading

- Demo: No headings except 1st page
- Command: `\endhead` ————— for displaying the contents in all the pages

Now, you can ...

- Handle large tables using longtable environment

Thank you



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Session: Table Environment

You will learn to ...

- Work with table environment

Overview

- Add captions
- Position the table
 - t: top
 - b: bottom
 - h: approximately here

Table Environment

- Environment

```
\begin{table}[position]  
  your tabular code  
  \caption{...}  
\end{table}
```

Example

```
\begin{table}[t]
  \begin{tabular}{1|1}
    No. & Items \\
    1 & Pen \\
    ...
  \end{tabular}
  \caption{Stationery Items}
\end{table}
```

useful when a table appears bw paragraphs.

usual case.

for caption

h - place the table here.
b - bottom of that page no



Demo

List of Tables

- Placed just after table of contents
- `\listoftables` ————— for displaying the captions of the tables that we have created.

Now, you can ...

- Add captions to the table
- Position the table
- Generate list of tables

Thank you



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Session: Including Graphics

You will learn to ...

- Include images and resize them

Overview

- Package: `graphicx`
- Supported formats: `jpg`, `png`, `eps`, `pdf`
- Resize
- Scale
- Trim/Crop
- Rotate
- Border

Include Graphics

- `\includegraphics[attributes]{filename.extn}`
- Attributes to change size
 - width
 - height

Example: Falkirk Wheel

IMAGE MUST BE IN THE SAME FILE AS THAT OF THE CURRENT FILE. EG : IITCODES

```
\includegraphics{Falkirkwheel.jpg}
```



Example: Change height

```
\includegraphics[height=4cm]{Falkirkwheel.jpg}
```



Example: Change width

```
\includegraphics[width=4cm]{Falkirkwheel.jpg}
```



Example: Change both

```
\includegraphics[width=4cm, height=4cm]{Falkirkwheel.jpg}
```



No proportion, Avoid it.

Now, you can ...

- Include images and resize

Thank you



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Session: Image Properties

You will learn to ...

- Scale, crop, and rotate images

Scale

Scaled: `\includegraphics[scale=0.5]{parrot.png}`



Figure: Original



Figure: Scaled

Crop

Cropped: `\includegraphics[clip=true, trim=15mm 5mm 7mm 3mm]{parrot.png}`



Figure: Original



Figure: Cropped

Rotate

Rotate: `\includegraphics[angle=60]{parrot.png}`



Figure: Original



Figure: Rotated

Now, you can ...

- Scale an image
- Crop an image
- Rotate an image

References

<https://commons.wikimedia.org/wiki/File:Creative-Tail-Animal-parrot.svg>

Thank you



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Session: Working with Image Borders

You will learn to ...

- Add border to image
- Customize borders

Image Border

- `\fbox{ \includegraphics... }`
- `\fbox{ \includegraphics{computer.png} }`



Border Thickness

- `\setlength{\fboxrule}{2pt}`



Border Spacing

- `\setlength{\fboxsep}{15pt}`





Now, you can ...

- add border to an image
- vary the thickness of the border
- add spacing between the border and an image

Thank you



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Session: Figure and Sub Figure

You will learn to ...

- Specify caption for a figure
- Generate list of figures
- Include multiple images under one image

Figure Environment

- Environment

```
\begin{figure}[position]  
  \includegraphics[...]{...}  
  \caption{...}  
\end{figure}
```

- List

```
\listoffigures
```



Demo

Sub-Figure



(a) Original



(b) Rotated: 90 degrees



(c) Rotated: 180 degrees

Figure: Image of a Parrot

Sub-Figure

- Package: caption, subcaption
- Structure

```
\begin{figure}[<position>]
  \begin{subfigure}{<width>}
    \includegraphics...
    \caption{...}
  \end{subfigure}
  ...
  \caption{...}
\end{figure}
```

h,b,t

h - here

b - bottom

t - top

subfigure.tex

0.45\textwidth denotes that the width of the text on the page and 0.45 denotes the sub-figure would occupy a space which is little less than of the text width.

Now, you can ...

- Specify caption and position the figure
- Generate list of figures
- Include multiple figures under one figure

Thank you



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Session: Recapitulate Topic 4

Recapitulate Session 20

- Created a basic table
- Aligned content of the table
- Adjusted the width of the column

Recapitulate Session 21

- Added full borders to the table (hline)
- Added necessary borders to the table (cline)
- Added dashed borders to the table using `arydshln` package

Recapitulate Session 22

- Merged rows and columns of a table
- Added spacing to the table

Recapitulate Session 23

- Used longtable for handling large data in a table
- endhead command to repeat the header rows on every page

Recapitulate Session 24

- Table environment
- Position the table
- Added captions
- Created a list of tables

Recapitulate Session 25

- Include images and supported format types
- Changed width and height of an image

Recapitulate Session 26

- Scaled the image
- Cropped the image
- Rotated the image

Recapitulate Session 27

- Added borders for an image
- Adjusted the border thickness
- Space between the border and image

Recapitulate Session 28

- Figure environment (position, caption, list of figures)
- Sub-Figure environment

Thank you



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Session: Creating Title Page

You will learn to ...

- Create a title page

Recapitulate maketitle

- title
- author
- date
- `\maketitle`

Examine titlepage

- Environment: titlepage

```
\begin{titlepage}
```

```
...
```

```
\end{titlepage}
```

- Add text and images
- Style text



Now, you can ...

- Create a title page
 - Style Text
 - Add logos

Thank you



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Session: Hyperlinks

You will learn to ...

- Add hyperlinks
- Add hypertext (link with an alias)

Hyperlinks – URL

- Package: url
- Displays the link
- `https://firuza.github.io/`
`\url{https://firuza.github.io/}`

Hypertext – href

hyperlink.tex

- Package: hyperref
- Displays the Alias which points to the link — a hyperlink is too long
- Click here to view more information

Click `\href{https://firuza.github.io/}{here}`
to view more information

Now, you can ...

- Add hyperlink
- Add hypertext

Thank you



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Session: Cross Referencing

You will learn to ...

- Add labels
- Refer them
- Cross referencing

Cross Referencing

- Refer
 - Section, subsection, ...
 - Table
 - Figure
 - Page number

- Label: `\label{KEY}`

creating a label with some key

- Refer

- `\ref{KEY}`
- `\pageref{KEY}`
- `\nameref{KEY}`

referring with that key

Best Practice for Defining Labels

- ch: chapter
section
- sec: subsection
- subsec: figure
table
- fig:
- tbl:



Now, you can ...

- Add labels
- Refer to them in the document

Thank you



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Session: Creating Indexes

You will learn to ...

- Create index (back index)
- Format it
- Display in ToC

Overview

- Entry of a word at the end
- Used to refer using page number

Steps

- Include package and make the index
`\usepackage{imakeidx}`
`\makeindex`
- Create index keys (Words)
`\index{KEY}`
- Display them (Usually at the end)
`\printindex`



Demo

Format Indexes

cross referencing the index

- Subentry

```
\index{ParentKEY!KEY}
```

index.tex

index1.tex

- Cross referencing a key

```
\index{KEY|see{OtherKEY}}
```

Number of Columns

- Columns
`\makeindex[columns=X]`
X denotes a number
- Display custom title
`\makeindex[title=Back Index]`
- Add the entry in Table of Contents
`\makeindex[intoc]`



Demo

Now, you can ...

- Create an index
- Add sub entry
- Cross reference a key
- Format the index
- Display custom title
- Add entry in ToC

Thank you



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Session: Creating Bibliography

You will learn to ...

- Add and Style references

Overview

- Attribute
- Research papers, journals, books, articles, etc.
- Create bib file
- Cite it in the document

Bibliography File (.bib)

- Example 1

```
@inproceedings{KEY,  
  title={},  
  author={},  
  booktitle={},  
  pages={X--Y},  
  year={},  
  organization={}  
}
```

- Example 2

```
@article{KEY,  
  title={},  
  author={},  
  journal={},  
  volume={},  
  number={},  
  pages={X--Y},  
  year={},  
  publisher={}  
}
```

- Example 3

```
@book{KEY,  
  title={},  
  author={},  
  volume={},  
  year={},  
  publisher={},  
  location={}  
}
```

Get bibtex

- BibTeX
- Google scholar
- Click Cite, BibTeX
- Copy



Cite

- Cite
`\cite{KEY}`
- Styles: plain, alpha, unsrt, acm
`\bibliographystyle{Style}`
- bib file
`\bibliography{filename}`
- Include reference without citing
`\nocite{KEY}`

Paper Style

- Templates
- IEEE <https://www.ieee.org/conferences/publishing/templates.html>

Now, you can ...

- Create .bib file
- Add references
- Use different bibliography styles

Thank you



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Session: Recapitulate Topic 5

Recapitulate 30

- Environment: `titlepage`
- Created a sample title page
- Exercise

Recapitulate 31

- Hyperlinks and Hypertext
- Packages: url, hyperref
- Commands: url, href

Recapitulate 32

- Cross-Referencing
- Commands: label, ref, pageref, and nameref

Recapitulate 33

- Created Index
- Package: imakeidx
- Added entries, subentries, and cross-referencing
- Commands: makeindex, index, printindex
- Formatted

Recapitulate 34

- Added references
- Created .bib file
- Added references (BibTeX)
- bibliography, bibliographystyle
- Formatted a basic article into IEEE Format

Thank you



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Session: Introduction to Beamer

You will learn to ...

- Create presentations in Beamer

Overview

- Creating Presentation Slides
- Microsoft PowerPoint, LibreOffice Impress, etc.
- Document Class: beamer
- Slides

```
\begin{frame}[t|c|b]{Frame Title}
```

...

```
\end{frame}
```

- Rest is LaTeX ...

t c b denotes the alignment of the text on the slide.

by default the content is vertically centred.



Themes and Color Themes

- `https://hartwork.org/beamer-theme-matrix/`
- `\usetheme{....}`
- `\usecolortheme{...}`

in this link the themes are mentioned vertically while the color themes are mentioned horizontally.



Demo

ToC

- Create sections
- `\tableofcontents`



Demo

Now, you can ...

- Create presentations using Beamer
- Choose theme and color theme

Thank you



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Session: Blocks and Columns

You will learn to ...

- Add blocks
- Divide content into columns

Blocks

- `\begin{block}{Title}`

...

`\end{block}`

- `\begin{alertblock}{Title}`

...

`\end{alertblock}`

- `\begin{example}`

...

`\end{example}`

no title in the example block.



Demo

Columns

- Environment

```
\begin{columns}
```

```
...
```

```
\end{columns}
```

- Columns

```
\column{X\textwidth}
```



Demo

Now, you can ...

- Add basic, alert, and example blocks
- Divide the content into multiple columns

Thank you



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Session: Overlays

You will learn to ...

- Need to display only certain

You will learn to ...

- Need to display only certain
 - text

You will learn to ...

- Need to display only certain
 - text
 - rows of a table

You will learn to ...

- Need to display only certain
 - text
 - items
 - rows of a table

You will learn to ...

- Need to display only certain
 - text
 - items
 - rows of a table
- Reveal them one by one

You will learn to ...

- Need to display only certain
 - text
 - items
 - rows of a table
- Reveal them one by one
- What we just did!

You will learn to ...

- Need to display only certain
 - text
 - items
 - rows of a table
- Reveal them one by one
- Add animation effects to text (Overlays)
- What we just did!

Overview

- Pause
- $\langle \text{No} - \rangle$
- $\langle \text{No} \rangle$
- Onslide

Pause

- `\pause`
- Used in lists, blocks, text, etc.
- Displays one by one
- Sequential



Demo

Overlay

present.tex

present1
.tex

- Used in lists, blocks, etc.
- Sequence number is specified
- Displays items in the specified sequence
- `<No— >`
- `<No>`

random display

red \pause

blue

yellow

for ordered display

output:

1 slide :red

2 slide:red blue yellow



Demo

Onslide

- Similar to overlay
- Displays text in specified sequence
- Used for normal text, tables, etc.
- `\onslide< No. – >`



Style

- Transparent Items

```
\setbeamercovered{transparent}
```

- Revert back

```
\setbeamercovered{invisible}
```

Now, you can ...

- Add effects to text, lists, blocks, and tables

Thank you



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Session: Customize Basic Information

You will learn to ...

- Customize basic information
- Add logo

Customize Title Page

- Title

```
\title[...]{...}
```

breif titlepage.tex

- Author

```
\author[...]{...}
```

- Institute

```
\institute[...]{...}
```

- Logo

```
\logo{\includegraphics{...}}
```

note: logo appears on all slides.

[Demo]

Now, you can ...

- Mention alias for title, author, institute
- Add logo

Thank you



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Session: Customize Themes

You will learn to ...

- Change colors of the theme

Theme Color

- `\setbeamercolor{structure}{fg=color}`
- Try out different colors
- Try out different themes



Color Elements (Footer)

bg=background color
fg=color of the text

- Tertiary

```
\setbeamercolor{palette tertiary}{bg=color, fg=color}
```

- Secondary

```
\setbeamercolor{palette secondary}{bg=color, fg=color}
```

- Primary

```
\setbeamercolor{palette primary}{bg=color, fg=color}
```



Demo

Color Elements (Title, Frametitle)

- Title

```
\setbeamercolor{title}{bg=color, fg=color}
```

- Frame Title

```
\setbeamercolor{frametitle}{bg=color, fg=color}
```

Background Color

- `\setbeamercolor{background canvas}{bg=color}`



Demo

Now, you can ...

- Change theme color, background color

Thank you



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Session: Aspect Ratio

You will learn to ...

- Specify aspect ratio

Aspect Ratio

- Relationship between width and height
- Represented as $a:b$
- Standards: 4:3, 16:9
- Open the pdf in presentation mode

Aspect Ratio

— the slide becomes wider.

- `\documentclass[aspectratio=169]{beamer}`



Demo

Now, you can ...

- Mention 16:9 aspect ratio

Thank you



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Session: Recapitulate Topic 6

Recapitulate Session 36

- Created first presentation in Beamer
- Explored themes and color themes
- Commands: `usetheme`, `usecolortheme`
- Environments for each slide: `frame`

Recapitulate Session 37

- Blocks: block, alertblock, examples
- Divided content into columns

Recapitulate Session 38

- Overlays
- Commands: `pause`, `onslide`, `<-No.>`, `<No.>`

Recapitulate Session 39

- Added basic information and alias
- Logo

Recapitulate Session 40

- Customized the color themes
- Changed colors of each element in beamer structure

Recapitulate Session 41

- Aspect ratio
- Command: `aspectratio=169`

Thank you

