

Basic L^AT_EX Workshop 2018 Introduction

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What is L^AT_EX

- LaTeX is a markup language developed by Lamport [1] based on TEX [2]. It uses tags or commands to define elements within elements. It is human-readably meaningful markup files contains standard word rather than typical programming syntex, which means any body who can read and write and who can use a computer can use LaTeX.
- To use L^AT_EX you don't need to know TEX programming language nor how L^AT_EX macros are programmed.
- You use these ready-made commands, or macros to obtain the required document through some simple and logical instructions.

Advantages of using L^AT_EX

- It is an independent platform.
- It lets you concentrate on documents structure and content, because the formatting is done globally.
- It generates numbering of chapters, sections, subsections, figures, tables and mathematics equations.
- It generates table of contents, list of figures, list of tables, list of references and index.
- It places figure and table at appropriate locations with no blank space.

More Advantages of using L^AT_EX

- It capable of doing forward or backward cross-reference to any numbered environment, without referring to the actual numbering.
- If you add or delete or rearrange chapters, sections, subsections, figures, tables or mathematics equations, or references, the renumbering are done by LaTeX.
- Templates provided by publishers (established publishers provide LaTeX templates) will produce the output (document) with the required format.

Comparison between Microsoft Office & L^AT_EX Template

Microsoft Word Template	LaTeX Template
A set of instructions (e.g. for a tailor how to cut clothes to make dress)	Similar to a mould (e.g. for making cake with a particular shape)
You type manually to obtain the required document	You supply the universal input
Human being performs the typesetting	Computer performs the typesetting

Structure of L^AT_EX Input File

(File extension is .tex with no space for name e.g. MyFile.tex)

```
\documentclass{...}
```

} Preamble

```
\begin{document}
```

}

Where you write your document

```
\end{document}
```

e.g. `\documentclass{article}` and `\documentclass{book}` Publishers have their own documentclass.

Preamble contains global commands.

Any .tex file should be placed in a folder specially for the file because usually there are other files that you need to run the file.

Example of L^AT_EX Input File

```
\documentclass{article}
```

```
\begin{document}
```

The ends of words and sentences are marked by spaces. It does not matter how many spaces you type; one is as good as 100.

One or more blank lines denote the end of a paragraph.

See what I mean.

```
\end{document}
```

To Obtain the Output

When first running a particular .tex file, your computer must be connected to internet. You click the typset menu on Example.tex and the file Example.dvi will appear on the screen as follows:

The ends of words and sentences are marked by spaces. It does not matter how many spaces you type; one is as good as 100.

One or more blank lines denote the end of a paragraph.

See what I mean.

Pdf file Example.pdf can be obtained by clicking pdf menu on Example.dvi . The LaTeX default output for article documntclass is computer modern roman font with font size 10 pt.

We will discuss later how to change the font type, font size, text width, text height etc.

Emphasizing Words

- If you want the **wordsA** to be in bold you type `\textbf{wordsA}`
- If you want the *wordsB* to be in italic shape you type `\textit{wordsB}`
- If you want to quote a paragraph you type `\begin{quote}`
.....
`\end{quote}`
The output of the paragraph will be left and right indent.

Environment

The purpose of a LATEX environment is to make sure that the output for a particular environment comes out exactly the same way every time you use it in your document. An environment is typed as

```
\begin{environmentname}
```

...

```
\end{environmentname}
```

Examples of environment: abstract, definition, theorem, principle, example, exercise etc.

List Environment

Two type of commonly used type of list are itemize and enumerate.

```
\begin{listtype}  
\item ...  
\item ...  
\end{listtype}
```

List environment can be nested with one another.

Symbolic Cross-Referencing

- You assign a key of your choice to the things that you want to refer to and refer to it by that key, letting LaTeX translates the reference into number. The key is assigned a number by the `\label{key}` command, and the number is printed by the `\ref{key}` command.
- To make a reference to a page, you use `\pageref` command. It works exactly like `\ref`, taking the key as its argument, only it gives you the page number that the `\label` with the matching key is on.

Placing Figure (floating object)

Must put `\usepackage{graphicx}` in the preamble. LATEX create figure environment as follow:

I have two cats. See Figure `\ref{cats}`

```
\begin{figure}[htbp]
  \begin{centre}
    \includegraphics[scale=0.5]{sphynxcats}
    \caption{My cute cats}
    \label{cats}
  \end{centre}
\end{figure}
```

Placing Figure (floating object) (cont.)

LaTeX will place figure immediately after you refer to it (by the command `\ref{cats}`) at

h where you put if there is enough space

t top of next page

b bottom of next page

p next page by itself

and will fill with texts in the appropriate space so that there is no blank space (that is why a figure is called a floating object).

Placing Table (floating object)

LATEX create table environment as follow:

```
\begin{table}[htbp]  
\caption{...}  
\label{keyY} ...  
%your table ...  
\end{table}
```

It is similar to figure environment except caption for a table is at the top of the table (whereas for a figure is at the bottom of the figure).

Placing Table (floating object) (cont.)

```

\begin{table}[htbp]
\begin{centre}
\caption{Presentations Schedule}\label{PSchedule} \begin{tabular}{|l|p{4cm}|c|}
\hline
Date & Title & Speaker \\
\hline
7/4/11 & Beautiful Mind & Video \\
\hline
21/4/11 & Title A & Lecturer 1\\
\hline
3/5/11 & Title B & Lecturer 2\\
\hline
4/7/11 & To be announced two weeks before the date & Lecturer 3\\
\hline
\end{tabular}\end{centre}\end{table}

```

l for left alignment (r for right alignment)
p{3.6cm} for a paragraph of length 4 cm
c for center alignment

Table 1: Presentations Schedule 1

Date	Title	Speaker
7/4/11	Beautiful Mind	Video
21/4/11	Title A	Lecturer 1
3/5/11	Title B	Lecturer 2
4/7/11	To be announced two weeks before the date	Lecturer 3

Placing Table (floating object) (cont.)

```

\begin{table}[htbp]\caption{Presentations Schedule 2}\label{PSchedule2}
\begin{center}
\begin{tabular}{||p{4cm}|c|}
\hline
\rule{0ex}{3ex}Date & Title & Speaker \\ \ [1ex]
\hline
\rule{0ex}{3ex}7/4/11 & Beautiful Mind & Video \\ \ [1ex]
\hline
\rule{0ex}{3ex}21/4/11 & Title A & \raisebox{-5.5ex}[0ex][0ex]{Lecturer 1} \\ \ [1ex]
\cline{1-2}
\rule{0ex}{3ex}3/5/11 & Title B & \\ \ [1ex]
\cline{1-2}
\rule{0ex}{3ex} \raisebox{-1.5ex}[0ex][0ex]{4/7/11} & To be announced two weeks
before the date & \\ \ [4ex]
\hline
\end{tabular}\end{center}\end{table}

```

Table 2: Presentations Schedule 2

Date	Title	Speaker
7/4/11	Beautiful Mind	Video
21/4/11	Title A	Lecturer 1
3/5/11	Title B	
4/7/11	To be announced two weeks before the date	

Mathematical Formula

- A formula in text is enclosed by \$ sign.
The Einstein formula $E = mc^2$ is the most famous formula in mathematics is obtained by the input ... `$E=mc^2$` ...

- A display formula is enclosed by

`\begin{equation}`

...

`\end{equation}`.

Formula (1) is Euler formula

$$e^{i\theta} = \cos \theta + i \sin \theta \quad (1)$$

is obtained by the input

```
\begin{equation}\label{Euler}
e^{i\theta}=\cos\theta+i\sin\theta
\end{equation}
```