EGCI 491
Computer Engineering Project Seminar #4

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LaTeX Tutorial (II)

- LaTeX Thai Font/Margin
- **Math Equation**
- **Table**
- **Bibliography**

Essential Formatting in LaTeX

1. Text Formatting: **B**old, ***I***talics, and <u>U</u>nderline
2. Lists
3. Alignments
4. Adding a picture(s)

Week#3

5. Thai Fonts/Margin Adjustment
6. **Math Typesetting**
7. **Adding a table(s)**
8. **Bibliography**

Week#4

Mahidol University
Faculty of Engineering

Thai font

1) Preamble

```
%% ---- Set up fonts and encoding ---- %%
\usepackage{fontspec}
%\usepackage{xunicode}
\usepackage{xltxtra}

% --- Enable line breaks for Thai text ---
\XeTeXlinebreaklocale "th"
\XeTeXlinebreakskip = 0pt plus 1pt

% ---------- Set up Thai fonts -------------
\setmainfont[ItalicFont={Laksaman-Italic.otf},
BoldFont={Laksaman-Bold.otf},
BoldItalicFont={Laksaman-BoldItalic.otf},
Script=Thai,
Scale=MatchLowercase,
WordSpace=1.25,
Mapping=tex-text,
]{Laksaman.otf}
%Laksaman is developped based on TH Sarabun New
```

Output

5 Adding a figure with Thai fonts

Figure 1: Mahidol University.

Mahidol University International College (MUIC; Thai: วิทยาลัยนานาชาติ มหาวิทยาลัยมหิดล) is Thailand's first public international college. It is part of Mahidol University and is located on the university's Salaya Campus in Nakhon Pathom Province.

2) Main Document

```
\begin{document}
    \section{Adding an image with Thai fonts}
    \setcounter{section}{4} %To start this section with 5
    \begin{figure}[!h]
        \noindent\Centering
        \includegraphics[width=0.25\textwidth]{MU_LOGO_Color}\\
        \caption{Mahidol University.}
        \label{fig:MU Logo}
    \end{figure}

    \noindent\textbf{Mahidol University International College}
    (\textbf{MUIC}; Thai: \color{red}วิทยาลัยนานาชาติ มหาวิทยาลัยมหิดล\color{black}) is
    Thailand's first public international college. It is part of Mahidol University
    and is located on the university's Salaya Campus in Nakhon Pathom
    Province.\\

\end{document}
```

Margin Adjustment

```
\documentclass[a4paper, 12pt]{article}
%Preamble
\usepackage[margin=1in]{geometry} %required to adjust the margin
%Main Document
\begin{document}
    ...
\end{document}
```

Note: *By Default:*

- ***1.5*** ***in*** *wide on* ***12pt*** *documents*
- ***1.75*** ***in*** *wide on* ***11pt*** *documents*
- ***1.875*** ***in*** *wide on* ***10pt*** *documents*

Inserting Math Equations

1. Inline math mode
2. Display math mode
3. Multiple-line equation alignment & numbering

An In-line Equation

$...$	\(... \)	\begin{math} .... \end{math}

```
\documentclass[a4paper, 12pt]{article} %Always requireed
% Preamble ---
\usepackage[margin=1.5in]{geometry} %To adjust margins
\usepackage{comment}   %To use a block comment in a document

\usepackage{amsmath}  % Required to use the equation* environment

% Main Document ---
\begin{document}
    \setcounter{section}{4} %To start this section with 5
    \section{Mathematical Equations } %Add section
    \subsection{An Inline Formula} %Add subsection

    This is an example of the inline-formula typesetting
    $f(x) = x^2$ which is equivalent to \(f(x) = x^2\) and also to
    \begin{math}
        f(x) = x^2
    \end{math} .

\end{document}
```

6 Mathematical Equations

6.1 An Inline Formula

This is an example of the inline-formula typesetting $f(x) = x^2$ which is equivalent to $f(x) = x^2$ and also to $f(x) = x^2$.

A new-line Equation (*without numbering*)

\[... \]	\begin{displaymath} .... \end{displaymath}

```
\documentclass[a4paper, 12pt]{article} %Always requireed
% Preamble ---
\usepackage{amsmath}  % Required to use the equation* environment

% Main Document ---
\begin{document}
    ...
    \subsection{A New-line Formulas without Number}
    This is a simple formula without numbering in a new line:\[f^2(x) = ax^2+bx+c\] which is equivalent to

    \begin{displaymath} % a new-line formular without numbering
        f_{i=1}^{n}(x) = 2x_i^2+1
    \end{displaymath}

\end{document}
```

Note: You can also use **$$**y = ax+b**$$** (but it is not recommended as you may occasionally observe inconsistent vertical spacing

6.2 A New-line Formulas without Number

This is a simple formula without numbering in a new line:

$$f^2(x) = ax^2 + bx + c$$

which is equivalent to

$$f_{i=1}^{n}(x) = 2x_i^2 + 1$$

Multiple-line Equation without number and alignment

\begin{align*} … \end{align*}

```
\documentclass[a4paper, 12pt]{article} %Always requireed
% Preamble ---
\usepackage{amsmath}  % Required to use the equation* environment

% Main Document ---
\begin{document}
    …
    \subsection{Multiple Lines of Formulas without Number and Alignment}
    The following is how to typeset multiple lines of formulas without number and alignment:
    \begin{align*}
        ax^3+bx^2+c = 4y\\
        y = ax^3+bx^2+c \\
        3x+4 = 2y
    \end{align*}
\end{document}
```

6.3 Multiple Lines of Formulas without Number and Alignment

The following is how to typeset multiple lines of formulas without number and alignment:

$$ax^3 + bx^2 + c = 4y$$
$$y = ax^3 + bx^2 + c$$
$$3x + 4 = 2y$$

Multiple-line Equation **without number**, but alignment

\begin{align*} … &= … \end{align*}

```
\documentclass[a4paper, 12pt]{article} %Always requireed
% Preamble ---
\usepackage{amsmath}  % Required to use the equation* environment

% Main Document ---
\begin{document}
    …
    \subsection{Multiple Lines of Formulas without Number}
    The following is how to typeset multiple lines of formulas without alignment and number:
    \begin{align*}
        ax^3+bx^2+c &= 4y\\
        y &= ax^3+bx^2+c \\
        3x+4 &= 2y
    \end{align*}
\end{document}
```

6.4 Multiple Lines of Formulas without Number, but Alignment

The following is how to typeset multiple lines of formulas without number, but alignment:

$$\begin{aligned} ax^3 + bx^2 + c &= 4y \\ y &= ax^3 + bx^2 + c \\ 3x + 4 &= 2y \end{aligned}$$

Multiple-line Equation with number

\begin{align} … \end{align}

```
\documentclass[a4paper, 12pt]{article} %Always requireed
% Preamble ---
\usepackage{amsmath}  % Required to use the equation* environment
% Main Document ---
\begin{document}
    \subsection{Multiple Lines of Formulas with Number}
    The following is how to typeset multiple lines of formulas with number:
    \begin{align} %Multiple-lines Equations with Numbering
        \begin{split} %Separate equations but count as one number
            ax^3+bx^2+c &= 4y\\
            &\quad +(2y^2+d)
        \end{split}\\
        y &= ax^3+bx^2+c\\
        3x+4 &= 2y
    \end{align}
\end{document}
```

Name	Command	Example
default space		$abc \rightarrow\leftarrow abc$
thin space	`\,`	$abc \rightarrow \leftarrow abc$
thin neg. space	`\!`	$abc \rightarrow\!\leftarrow abc$
medium space	`\:`	$abc \rightarrow \leftarrow abc$
large space	`\;`	$abc \rightarrow \leftarrow abc$
0.5em space	`\enspace`	$abc \rightarrow \leftarrow abc$
1em space	`\quad`	$abc \rightarrow \quad \leftarrow abc$
2em space	`\qquad`	$abc \rightarrow \qquad \leftarrow abc$
custom space	`\hspace{3em}`	$abc \rightarrow \hspace{3em} \leftarrow abc$
fill empty space	`\hfill`	$abc \rightarrow \cdots$

Created by http://texblog.org

6.5 Multiple Lines of Formulas with Number

The following is how to typeset multiple lines of formulas with number:

$$ax^3 + bx^2 + c = 4y + (2y^2 + d) \quad (1)$$

$$y = ax^3 + bx^2 + c \quad (2)$$

$$3x + 4 = 2y \quad (3)$$

Tables

1. Creating a Basic Table
2. Adding Borders
3. Captions, Labels and Cross References

A Basic Table using *Build-In Commands*

```
\begin{document}
    ...
    \begin{table}[h!]
        \centering
        \caption{A) Add a caption above the table here.}
        \begin{tabular} {| c | c |  c | c |}
            \hline % Add a horizontal line
                        Col1 & Col2 & Col3  & Col4       \\
            \hline
                        R1     & 12    & 13    & 14     \\
                        R2     & 22    & 23    & 24     \\
                        R3     & 32    & 33    & 34     \\
            \hline
        \end{tabular}
        %\caption{B) Uncomment to add a caption below the table here.}
        \label{table:t_basic1}    % For cross reference
    \end{table}
\end{document}
```

Output

Table 1: A) Add a caption above the table here.

Col1	Col2	Col3	Col4
R1	12	13	14
R2	22	23	24
R3	32	33	34

Table Adjustments

```
\begin{document}
    ...
    \begin{table}[h!]
        \centering\caption{A basic table with some adjustments.}
        \vspace{0.5em} %Add space below the caption
        \begin{tabular}      {| c | c  c | c |}
            \hline % Add a horizontal line
                                &      &      &      \\[-0.9em] % Add extra space
                                Col1 & Col2 & Col3 & Col4 \\[0.1em]
            \hline
            \hline
                                &      &      &      \\[-0.9em] %Add extra space
                                R1 & 12 & 13 & 14 \\
                                R2 & 22 & 23 & 24 \\
                                R3 & 32 & 33 & 34 \\[0.1em]
            \hline
        \end{tabular}
        %\caption{B) Uncomment to add a caption below the table here.}
        \label{table:data}  % For cross reference
    \end{table}
\end{document}
```

Output

Table 2: A basic table with some adjustments.

Col1	Col2	Col3	Col4
R1	12	13	14
R2	22	23	24
R3	32	33	34

Insert A Table using "*tabularray*" Package

```
\begin{document}
    ...
    %Using package "tabularray" to creat tables
    \begin{table}[ht]  %Put the table here at the top of the next page if it happens
        \footnotesize       %Define font size in the table
        \centering\caption{A table created by using package "tabularray" }
        \vspace{0.7em} % Add extra space below the caption
        \label{table:t_tabularray}
        \begin{tblr}{
            %colspec = {*{12}{X}}, %Uncomment to increase col width
            cells={halign=c},       %Vetically Centered
            vlines,
            %hlines,                %Uncomment to draw all horizontal lines
            stretch=1.4             %Stretch Vertical Space
        }
        \hline
        \SetCell[r=2]{} Col1    & \SetCell[c=2]{} Merged Col2-3 &    & \SetCell[r=2]{} Col4 \\
        \hline\
                                & Col2      & Col3      &                   \\
        \hline
        \hline
                        R1  & 12        & 13        & 14                \\
                        R2  & 22        & 23        & 24                \\
                        R3  & 32        & 33        & 34                \\
        \hline
        \end{tblr}
    \end{table}
\end{document}
```

Output

Table 3: A table created by using ”tabularray” package

Col1	Merged Col2-3		Col4
	Col2	Col3	
R1	12	13	14
R2	22	23	24
R3	32	33	34

Biography

Three main options

- Bibtex :easier and more flexible
- **Natbib*** :**used in most journals** (***MU Senior Project Template***)
- Biblatex :used in most journals

Bibliography Management with **natbib**

1. **\usepackage[options]{*natbib*}**
   To import the package **natbib**

2. **\bibliographystyle{*BibStyleName*}**
   To Sets the bibliography style

3. **\bibliography{*BibFileName*}**
   To insert a bibliography, where *BibFileName* is the name of a *.bib file

4. **Commands**

\cite{*label*}	To cite an entry in a ***.bib** file
\citet{}	Textual citation
\citet*{}	Same as \citet with all author names printed
\citep{}	Parenthetical citation
\citep*{}	Same as \citep prited with all author names
\citeauthor{}	Prints only the name of the authors(s)
\citeyear{}	Prints only the year of the publication.

Options:

`round` (default) for round parentheses;

`square` for square brackets;

`curly` for curly braces;

`angle` for angle brackets;

`semicolon` (default) to separate multiple citations with semi-colons;

`colon` the same as `semicolon`, an earlier mistake in terminology;

`comma` to use commas as separators;

`authoryear` (default) for author–year citations;

`numbers` for numerical citations;

`super` for superscripted numerical citations, as in *Nature*;

Bibliography styles:

- Dinat
- Plainnat
- **Abbrvnat***
- Unsrtnat
- Rusnat
- ksfh_nat

(https://www.overleaf.com/learn/latex/Bibtex_bibliography_styles)

\usepackage[options]{*natbib*}

Option	Meaning
round : square : curly : angle	Parentheses **()** (default), square brackets **[]**, curly braces **{}** or angle brackets **<>**
colon : comma	Multiple citations are separated by semi-colons (default) or commas
authoryear : numbers : super	author year style citations (default), numeric citations or superscripted numeric citations
sort : sort&compress	Multiple citations are sorted into the order in which they appear in the references section or also compressing multiple numeric citations where possible
longnamesfirst	the first citation of any reference will use the starred variant (full author list), subsequent citations will use the abbreviated *et al.* style
sectionbib	for use with the chapterbib package. redefines \thebibliography to issue \section* instead of \chapter*
nonamebreak	keeps all the authors' names in a citation on one line to fix some hyperref problems - causes overfull hboxes

Examples: Bibliography Styles

Style Name	Examples
abbrvnat	•\cite{ReferenceKey} : Lapamonpinyo et al. (2022) •\citep{ReferenceKey} : (Lapamonpinyo et al., 2022) **Reference** P. Lapamonpinyo, S. Derrible, and F. Corman. Real-time passenger train delay prediction using machine learning: A case study with amtrak passenger train routes. *IEEE Open Journal of Intelligent Transportation Systems*, 3:539–550, 2022. doi: 10.1109/OJITS.2022.3194879.
unsrtnat	•\cite{ReferenceKey} : Lapamonpinyo et al. [2022] •\citep{ReferenceKey} : [Lapamonpinyo et al., 2022] ***Reference*** Pipatphon Lapamonpinyo, Sybil Derrible, and Francesco Corman. Realtime passenger train delay prediction using machine learning: A case study with amtrak passenger train routes. *IEEE Open Journal of Intelligent Transportation Systems*, 3:539–550, 2022. doi: 10.1109/OJITS.2022.3194879.
plainnat	•\cite{ReferenceKey} : Lapamonpinyo et al. (2022) •\citep{ReferenceKey} : (Lapamonpinyo et al., 2022) ***Reference*** Pipatphon Lapamonpinyo, Sybil Derrible, and Francesco Corman. Realtime passenger train delay prediction using machine learning: A case study with amtrak passenger train routes. *IEEE Open Journal of Intelligent Transportation Systems*, 3:539–550, 2022. doi: 10.1109/OJITS.2022.3194879.

Example: Source Code

```
\begin{document}
    \section{Bibliography using \color{blue}\texttt{natbib}}
    This followings are examples of using \textbf{\texttt{natbib}} package for bibliography management. %There are xxx items cited:
    \begin{itemize}
        \item Use the command \verb|\cite{ReferenceKey}| to cite an entry showing only reference number such as \cite{PTDP2022}
        \item  Use the command \verb|\citet{ReferenceKey}| to show the first author's name and reference number such as \citet{PTDP2022}
        \item  Use the command \verb|\citet*{ReferenceKey}| to cite an entry with all authors' name such as \citet*{PTDP2022}
    \end{itemize} To cite multiple items such as I) an article \cite{PTDP2022}, II) a \LaTeX\ book \cite{latexcookbook}, and III) Overleaf \LaTeX\ Tutorial website \cite{overleaf}, you can simply cite them at the same time in the curly brackets/braces as follow:
    \begin{equation}
        \verb|\cite{ReferenceKey1, ReferenceKey2,...}|
    \end{equation}
    \indent For example, using  \verb*|\cite{PTDP2022,latexcookbook,overleaf}| to cite three items will show the citation as \cite{PTDP2022, latexcookbook, overleaf}
\end{document}
```

Example: Output

Open code exmaple .tex file "**08 Bibliography.text**"

8 Bibliography using natbib

This followings are examples of using **natbib** package for bibliography management.

- Use the command `\cite{ReferenceKey}` to cite an entry showing only reference number such as [2]
- Use the command `\citet{ReferenceKey}` to show the first author's name and reference number such as Lapamonpinyo et al. [2]
- Use the command `\citet*{ReferenceKey}` to cite an entry with all authors' name such as Lapamonpinyo, Derrible, and Corman [2]

To cite multiple items such as I) an article [2], II) a LaTeX book [1], and III) Overleaf LaTeX Tutorial website [3], you can simply cite them at the same time in the curly brackets/braces as follow:

```
\cite{ReferenceKey1, ReferenceKey2,...}
```
(1)

For example, using `\cite{PTDP2022,latexcookbook,overleaf}` to cite three items will show the citation as [1, 2, 3]

The Bibliography File (*.bib)

(1) .tex + (2) .bib

```
@article{PTDP2022,
    author      =   "Pipatphon Lapamonpinyo and Sybil Derrible and Francesco Corman",
    title       =   "Real-Time Passenger Train Delay Prediction Using Machine Learning: A Case Study with Amtrak Passenger Train Routes",
    journal     =   "IEEE Open Journal of Intelligent Transportation Systems",
    volume      =   "3",
    number      =   "",
    pages       =   "539-550",
    year        =   "2022",
    DOI         =   "10.1109/OJITS.2022.3194879“
}
@book{latexcookbook,
    author      =   "Stefan Kottwitz",
    title       =   "LaTeX Cookbook: Over 90 hands-on recipes for quickly preparing LaTex documents to solve various challenging tasks",
    year        =   "2015",
    publisher   =   "Packt Publishing",
    address     =   "Birmingham“
}
@misc{overleaf,
    author      =   "Overleaf",
    title       =   "Overleaf LaTeX tutorials",
    url         =   "https://www.overleaf.com/learn/latex/Tutorials"
}
```

Standard entry types

Entry Type	
Article	Article from a magazine or journal
Book	A published book
Booklet	A work that is printed but has no publisher or sponsoring institution
Conference	An article in a conference proceedings
Inbook	A part of a book (section, chapter and so on)
Incollection	A part of a book having its own title
Inproceedings	An article in a conference proceedings
Manual	Technical documentation
Mastersthesis	A Master's thesis
Misc	Something that doesn't fit in any other type
Phdthesis	A PhD thesis
Proceedings	The same as conference
Techreport	Report published by an institution
Unpublished	Document not formally published, with author and title

Most common fields used in BibTeX

address	annote	**author**
booktitle	chapter	crossref
edition	editor	institution
journal	key	**month**
note	number	Organization
pages	**publisher**	School
series	**title**	type
volume	**year**	**URL**
ISBN	**ISSN**	LCCN
abstract	keywords	price
copyright	language	contents


END
LaTeX II