



EGCI 491

Computer Engineering Project Seminar #3

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Faculty of Engineering,
Mahidol University

LaTeX I

- Introduction
- Installation
- Distributors and Editors
- LaTeX Structure
- A First Document
- Latex Tutorials 1/2



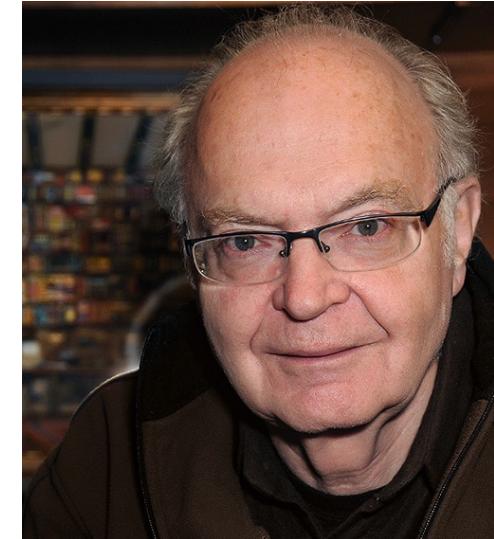
What is LaTeX

What is LaTeX

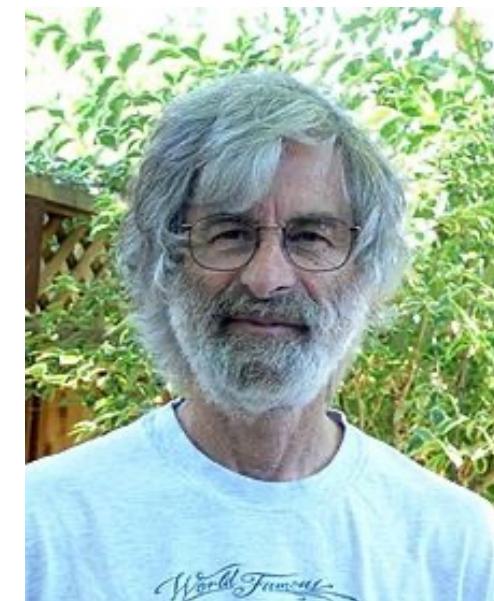
- **L A T E X is a typesetting program, or a document preparation software.**
- Specifically design to produce sophisticatedly pleasing documents such as technical and general articles, books, reports and even letters.
- Useful to produce slides for presentation.

A short history

- It is actually an outgrowth of **TEX** created by **Donald E. Knuth**, a Computer Science professor at Stanford University.
- LaTeX was developed in 1980s by **Leslie Lamport**, an American computer scientist and mathematician.



<https://www.frontiersofknowledgeawards-fbbva.es/galardonados/donald-e-knuth-2/>



https://en.wikipedia.org/wiki/Leslie_Lamport



LaTeX Distributors

You may choose the download site for your system:

- **TeX Live**: At <http://tug.org/texlive/>, you can find download information and installation instructions for the cross-platform TeX distribution that runs on Windows, Linux, Mac OS X, and other Unix systems. It is supported by the TeX Users Group (TUG).
- **MacTeX**: This is based on TeX Live and has been significantly customized for Mac OS X. The basic information is available at <http://www.tug.org/mactex/>.
- **MiKTeX** : The download and documentation of that Windows-specific distribution can be found at <http://www.miktex.org/>.
- **proTeXt**: This is for Windows only, and it is derived from MiKTeX, but proTeXt is more user-friendly during installation. Its home page can be found at <http://www.tug.org/protext/>.



LaTeX Installation

MiKTeX editor

<https://miktex.org/download>

(already with TeXworks installed)

Perquisites (only x64):

- **Windows** 11, 10
- **MacOS** 12, 11, 10.15 (Catalina)
 - <https://miktex.org/howto/miktex-console>
- **Ubuntu** 22.04, 20.04
- **Linux Mint** 21, 20
- **Debian** 11, 10
- **Fedora** 37, 36, 35
- **OpenSUSE** Leap 15

The screenshot shows the MiKTeX download page. At the top, there's a navigation bar with the MiKTeX logo and links for DOWNLOAD, DOCS, PACKAGES, HELP, and GIVEBACK. The main title is "Getting MiKTeX". Below it, a message says "MiKTeX is available for selected operating systems." A note below that says "Please check the [prerequisites](#) in order to find out whether your system is supported." Another note says "If your system is not (yet) supported: it is not too difficult to [build MiKTeX](#)." The "Windows" tab is selected, showing options for "Installer", "Portable Edition", and "Command-line installer". The "Installer" tab is active. Below it, instructions say "To install a basic TeX/LaTeX system on Windows, download and run this installer." It also says "Please read the [tutorial](#), if you want step-by-step guidance." To the right, there are details about the download: Date: 10/17/2022, File name: basic-miktex-22.10-x64.exe, Size: 132.66 MB, SHA-256: 1f6c197678f9b55adec8772f3a9e6d89f1e2d169f67c0d8494501813b9d3724f. A large blue "Download" button is at the bottom.



Update Packages (if required)

The screenshot shows the MiKTeX Console interface with the 'Updates' tab selected. The 'Install in:' path is set to `C:\Users\pipat\AppData\Local\Programs\MiKTeX`. A progress bar at the top right indicates 'Update in progress... 54% (installing: miktex-fribidixetex-bin-x64-2.9)'. The main window displays a table of available updates:

Name	Installed	Available	Action
miktex-expat...	2023-01-29 (2.5...)	install	to be repaired
miktex-fmt...	2023-01-29 (9.1...	install	to be repaired
miktex-dvico...	2023-01-29 (1.6)	install	to be repaired
miktex-devn...	2023-01-29 (2.17)	install	to be repaired
miktex-web...	2023-01-29	install	to be repaired
miktex-mkte...	2023-01-29 (23.1)	install	to be repaired
miktex-bibte...	2023-01-29 (4.00)	install	to be repaired
miktex-doc	2023-01-29 (23.1)	install	to be repaired
miktex-kpat...	2023-01-29 (1.1...	install	to be repaired
miktex-misc	2023-03-27	install	to be repaired
miktex-luate...	2023-01-29 (1.1...	install	to be repaired
miktex-data...	2023-01-29 (2.4)	install	to be repaired



Download additional packages

CTAN: <https://ctan.org/>

- “**stringenc**” may be required when using **UTF8** or **hyperref** packages

The screenshot shows a web browser displaying the Comprehensive TeX Archive Network (CTAN) package page for `stringenc`. The URL in the address bar is <https://ctan.org/pkg/stringenc>. The page title is "stringenc – Converting a string between different encodings".

Sources: [macros/latex/contrib/stringenc](#)
Documentation: [README.md](#), [Package documentation](#), <https://github.com/ho-tex/stringenc/issues>, <https://github.com/ho-tex/stringenc>
Bug tracker: [https://github.com/ho-tex/stringenc/issues](#)
Repository: [https://github.com/ho-tex/stringenc](#)
Version: 1.12 2019-11-29
Licenses: [The L^AT_EX Project Public License 1.3](#)
Copyright: 2007–2011 Heiko Oberdiek
2016–2019 Oberdiek Package Support Group
Maintainer: [Heiko Oberdiek](#)
TDS archive: [stringenc.tds.zip](#)
Contained in: [TeX Live](#) as `stringenc`, [MiK^TE_X](#) as `stringenc`
Topics: [Encoding.juggle](#)

Announcements: 2019-12-01 CTAN update: `stringenc` (more →)

Suggestions: Maybe you are interested in the following packages as well.

- convert: Generate Knuthian encoding for text files
- utf2any: Converting Unicoded text to L^AT_EX, HTML, etc
- kotex-plain: Macros for typesetting Korean under Plain TeX
- nath: Natural mathematics notation

(more →)

Rating Summary:

Download the contents of this package in one zip archive (692.6k).



TeXworks

The screenshot shows the TeXworks application interface. On the left, the 'main.tex' editor window displays the LaTeX source code for a thesis template. The code includes sections for document class, package imports, color definitions, figure paths, thesis meta data, and keywords. On the right, the 'main.pdf' viewer window shows the generated PDF document, which features the Mahidol University seal at the top and the title 'THESIS TITLE' below it.

```
%=====
%----- Logs -----
\newcommand{\version}{ver 2.1}
%=====

\documentclass{mahidol_thesis}
%==== Add the packages here =====
\usepackage{multirow}
\usepackage[table,xcdraw]{xcolor}
\usepackage{subcaption}
\usepackage{lscapte}
\usepackage{amsmath}
\usepackage{lipsum} %Generate dummy text for testing
%==== List of Coding Color Style =====
\definecolor{codegreen}{rgb}{0,0,60}
\definecolor{codegray}{rgb}{0.5,0.5,0.5}
\definecolor{codepurple}{rgb}{0.58,0,0.82}
% \definecolor{backcolour}{rgb}{0.95,0.95,0.92}
\definecolor{backcolour}{rgb}{1,1,1}
%=====

%==== Path to Figure Directories =====
\graphicspath{{./figures/chap1/}{./figures/chap2/}{./figures/chap3/}{./figures/chap4/}{./figures/chap5/}{./figures/chap6/}{./figures/appendix/}}


%%%%%%%%%%%%%
%Thesis Meta Data (edit each field)
%%%%%%%%%%%%%
%Thesis Title
\newcommand{\thesisTitle}{Thesis Title}
\newcommand{\thesisTitleTH}{ชื่อวิทยานิพนธ์}

%Thesis Keywords
\newcommand{\thesisKeywordsTH}{ ลาเท็ก / วิทยานิพนธ์ }
\newcommand{\thesisKeywords}{ LaTeX / Thesis }
```

LF UTF-8 Line 1 of 164; col 0 100% page 1 of 28



LaTeX Editors

- There are many LaTeX editors, from small and quick to very feature-rich editors.
- The TeX distributions (e.g., MikTex) already provide the fine editor **TeXworks**.
 - Download: <https://www.tug.org/texworks/>
- Alternatives
 - **TeXStudio**: <https://www.texstudio.org/>
 - **TexMaker**: <https://www.xm1math.net/texmaker/>



TeXstudio

File Edit Idefix Tools LaTeX Math Wizards Bibliography Macros View Options Help

Structure

- main.tex
 - > LABELS
 - > MAGIC_COMMENTS
 - > BIBLIOGRAPHY
 - chapter1.tex
 - chapter2.tex
 - chapter3.tex
 - chapter4.tex
 - AppendixA.tex
 - > chapter1.tex
 - > LABELS
 - > T₁ INTRODUCTION
 - > chapter2.tex
 - > LABELS
 - > T₁ LITERATURE REVIEW
 - > chapter3.tex
 - > T₁ METHODOLOGY
 - > chapter4.tex
 - > T₁ RESULT

This project begins with the intention to design a beneficial project for the university and for our advisors and instructors. We asked our advisors about the problems which she encountered. Subsequently, we thought about solutions which we could do to help her. She described that she faced problems about managing data in the MUIC Sky system. To explain, when she wants to check students' data, she could only check it individually on the Sky website because MUIC Sky website does not gather students' data together. Therefore, it costs a lot of user time to seek students' information and it may cause some mistakes.

\section{Background and Motivation}

This project begins with the intention to design a beneficial project for the university and for our advisors and instructors. We asked our advisors about the problems which she encountered. Subsequently, we thought about solutions which we could do to help her. She described that

Line: 1 Column: 0 INSERT

Messages Log Preview Search Results

CHAPTER 1 INTRODUCTION

This project begins with the intention to design a beneficial project for the university and for our advisors and instructors. We asked our advisors about the problems which she encountered. Subsequently, we thought about solutions which we could do to help her. She described that she faced problems about managing data in the MUIC Sky system. To explain, when she wants to check students' data, she could only check it individually on the Sky website because MUIC Sky website does not gather students' data together. Therefore, it costs a lot of user time to seek students' information and it may cause some mistakes.

1.1 Background and Motivation

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1. This project initially creates according to the course curriculum of Computer Engineering only. In other words, it only supports the use of instructors and advisors

in EGCI

Page 15 of 28 | 50%

abc en_US UTF-8 Ready Automatic



Privacy & Security

The screenshot shows the 'Privacy & Security' section of the Mac OS X System Preferences. It includes sections for Input Monitoring, Local Network, Microphone, Motion & Fitness, Remote Desktop, Screen & System Audio Recording, Speech Recognition, Sensitive Content Warning, Analytics & Improvements, Apple Advertising, and Security settings. The Security section allows users to manage app restrictions, accessory connections, FileVault, and Lockdown Mode.

Input Monitoring 0 >

Local Network 2 >

Microphone 6 >

Motion & Fitness 0 >

Remote Desktop 0 >

Screen & System Audio Recording 2 >

Speech Recognition 0 >

Sensitive Content Warning Off >

Analytics & Improvements >

Apple Advertising >

Security

Allow applications from App Store & Known Developers

Allow accessories to connect Ask for New Accessories

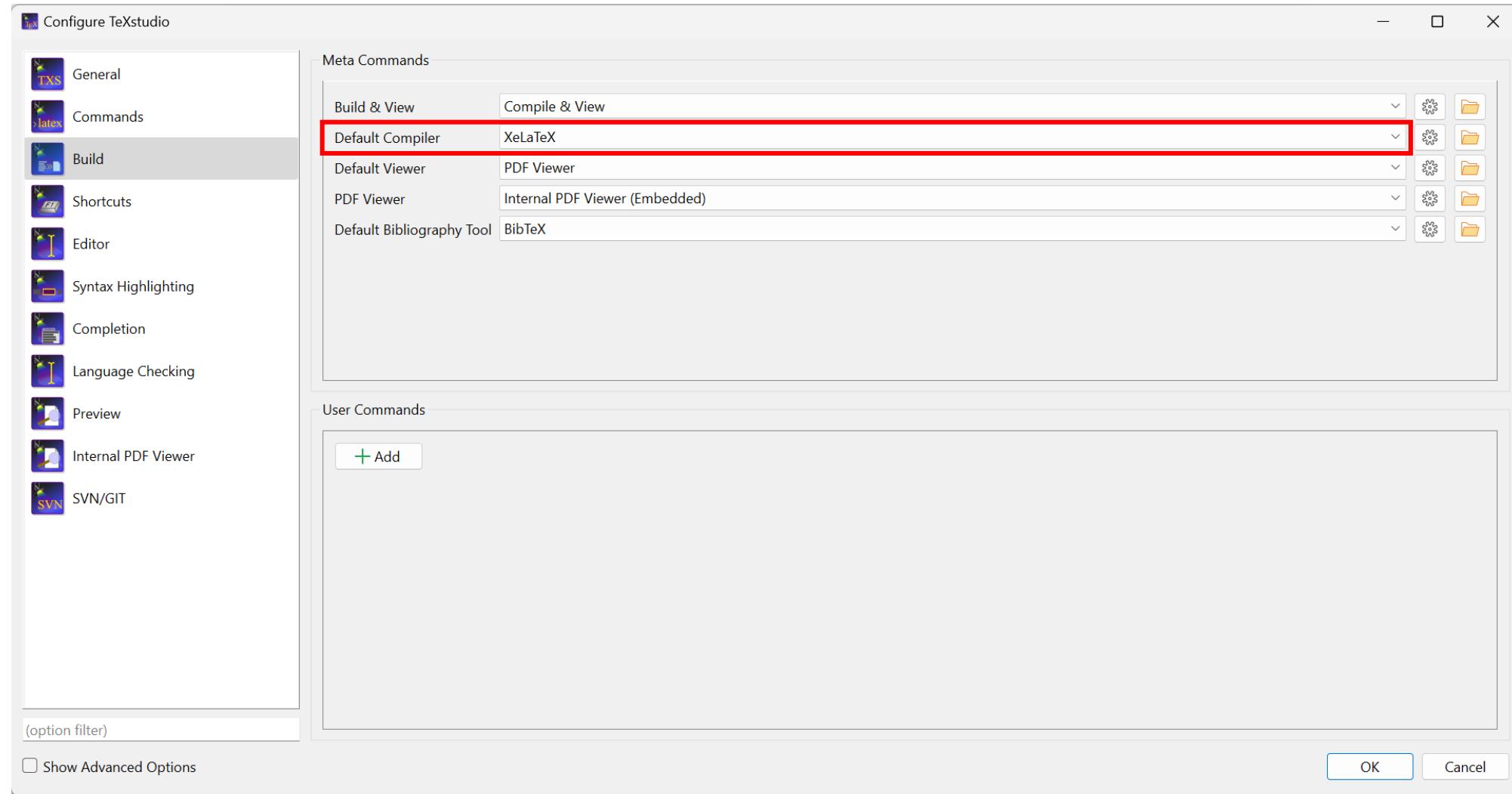
FileVault On >

Lockdown Mode Off >

Advanced... ?



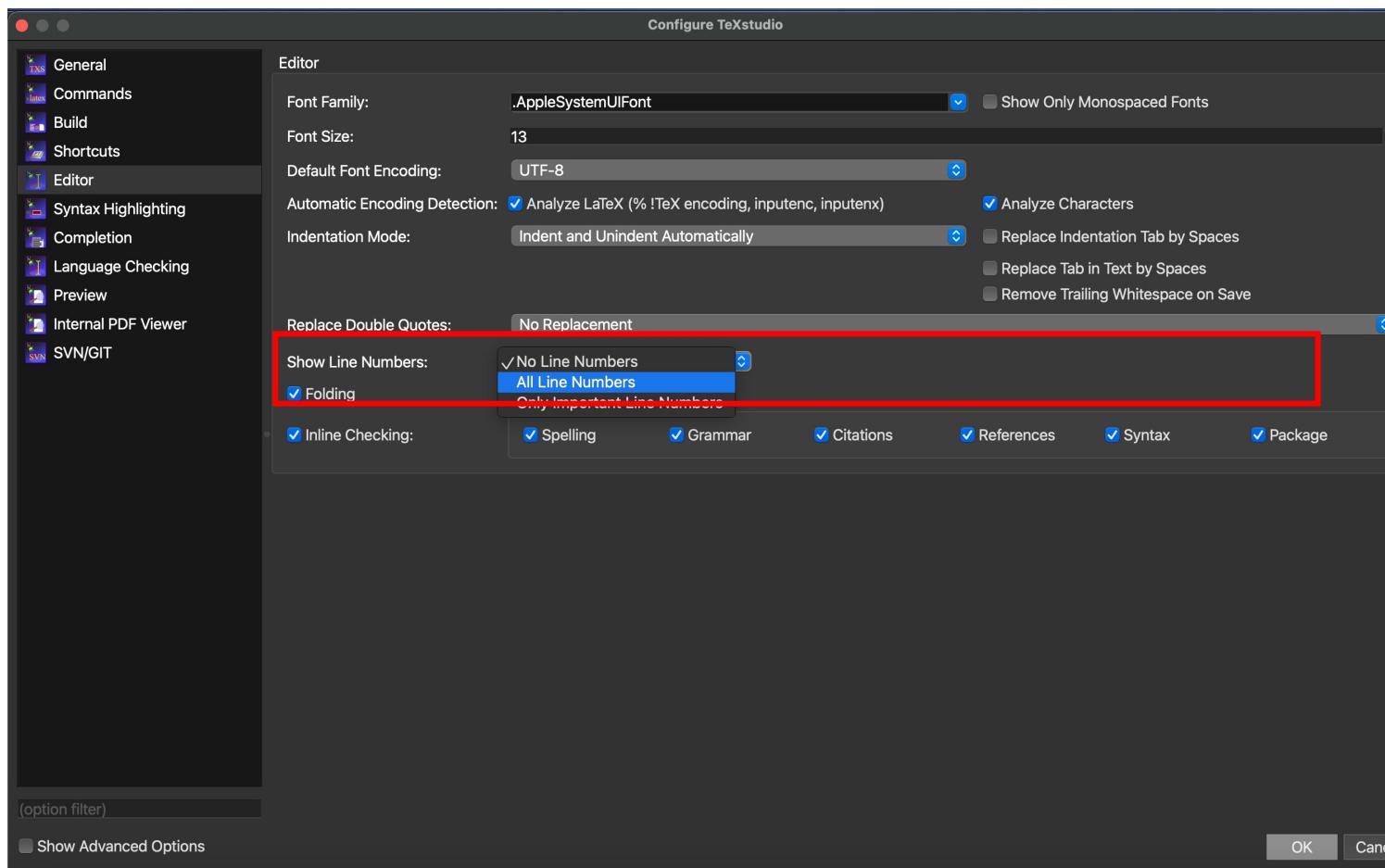
TeXstudio – Change a default complier if required





Show Line Number#

- TexStudio -> Preferences -> Editor -> Show Line Number





TeXmaker

The screenshot shows the TeXShop application window. The menu bar includes File, Edit, Tools, LaTeX, Math, Wizard, Bibliography, User, View, Options, and Help. The toolbar contains icons for opening, saving, printing, and navigating files. The title bar displays "LaTeX" and "View PDF".

The left sidebar is titled "STRUCTURE" and lists the project files: main.tex, LABELS, BLOCKS, chapter1.tex, chapter2.tex, chapter3.tex, chapter4.tex, references, and AppendixA.tex.

The main editor area shows the LaTeX code for "main.tex". The code includes document class definitions, package imports (e.g., graphicx, xcolor), and various document settings. A warning message at the bottom indicates a problem with the fontspec package.

The right sidebar is also titled "STRUCTURE" and provides a detailed file tree and line numbers for each file, along with icons for navigating between files.

The screenshot shows the TeXShop application window. The left sidebar displays the file structure under 'STRUCTURE' with files like main.tex, LABELS, BLOCKS, chapter1.tex, chapter2.tex, chapter3.tex, chapter4.tex, references, and AppendixA.tex. The top menu bar includes File, Edit, Tools, LaTeX, Math, Wizard, Bibliography, Options, and Help. A dropdown menu 'View PDF' is open. The main area shows the LaTeX code for 'main.tex' with line numbers 139 to 164. The code includes sections for tables, figures, and bibliography, as well as chapters 1 through 5 and an appendix.

```
\listoftables
\newpage
\listoffigures
%---- Body ----
\pagestyle{chapter}
\mainmatter
\pagestyle{fancy}
\input{chapter1.tex}
\input{chapter2.tex}
\input{chapter3.tex}
\input{chapter4.tex}
%\input{chapter5.tex}
\newpage
%---- Bibliography ----
\pagestyle{bibliography}
\bibliography{references}
\bibliographystyle{abbrvnat}
\label{lastpage}
\newpage
%---- Appendix ----
\coverAppendix
\pagestyle{appendix}
\appendix
\input{AppendixA.tex}

\end{document}
```

The figure shows a LaTeX editor interface with two main windows. The left window displays the LaTeX code for a document named 'main.tex'. The right window shows a preview of the document's layout.

Code View (main.tex):

```
\listoftables
\newpage
\listoffigures
%---- Body ----
\pagestyle{chapter}
\mainmatter
\pagestyle{fancy}
\input{chapter1.tex}
\input{chapter2.tex}
\input{chapter3.tex}
\input{chapter4.tex}
%\input{chapter5.tex}
\newpage
%---- Bibliography
\pagestyle{biblio}
\begin{bibliography}[ref]
\label{lastpage}
\end{bibliography}
\newpage
%---- Appendix ---
\coverAppendix
\pagestyle{appendix}
\begin{appendix}
\input{AppendixA.tex}
\end{appendix}
```

Preview Window:

The preview window shows the following content:

- A circular university logo at the top center.
- The text "THESIS TITLE" centered below the logo.
- A form field with three rows:
 - MR.FIRSTNAME LASTNAME
 - MRS.SECONDNAME SECONDLASTNAME
 - MIRTHRDNAME THIRDLASTNAME
- At the bottom, the text:

A PROJECT REPORT SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE
BACHELOR OF ENGINEERING IN COMPUTER ENGINEERING

FACULTY OF ENGINEERING & INTERNATIONAL COLLEGE
MAHIDOL UNIVERSITY
2023



LaTeX Structure

"00 LaTeX Document Structure.tex"

Output

Hello World

1) Preamble

- To tell LaTeX a type of document to create, and a package(s) you need.
- A package is a set of additional functions
 - “*amsmath*” for math formatting
 - “*graphicx*” for adding pictures

% Preamble

% ---
\documentclass{article}

% Packages
% ---

\usepackage{amsmath} % Advanced math typesetting
\usepackage [ngerman] { babel } % Change hyphenation rules
\usepackage{ hyperref } % Add a link to your document
\usepackage{ graphicx } % Add pictures to your document
\usepackage{ listings } % Source code formatting and highlighting

Always Required!

2) Main Document

- Indicate document environment

\... **LaTeX Command**
%... Single-Line Comment

% Main

\begin{document}

% ...

% ... Text goes here

Hello World

% ...

\end{document}



Special Symbols/Characters

A comprehensive list of special symbols:

<https://ctan.org/pkg/comprehensive?lang=en>

The screenshot shows the CTAN website interface with the 'comprehensive' package selected. The main content area displays the 'The Comprehensive L^AT_EX Symbol List – Symbols ac' page. It includes a brief introduction, a table of contents, and various links for sources, documentation, and related projects.

The Comprehensive L^AT_EX Symbol List – Symbols ac

Over 18000 symbols are listed as a set of tables. The tables of symbols are ordered in a logical way (the document begins with a ‘frequently requested symbols’ list), the aim being to make the document a convenient way of looking up symbols.

Sources	/info/symbols/comprehensive
Documentation	README Plain text list of symbol commands The document (for A4 paper) The document (for letter paper)
Version	14.0 2021-05-05
Licenses	The L^AT_EX Project Public License 1.3
Copyright	2007–2021 Scott Pakin
Maintainer	Scott Pakin
Contained in	TeX Live as comprehensive MiK_ET_EX as comprehensive
Topics	L^AT_EX Reference Font index



[Download](#) the contents of this package in one zip archive (57.2M).

TABLE 1: L^AT_EX 2_E Escapable “Special” Characters

\$	\\$	%	\%	-	_*	}	\}	&	\&	#	\#	{	\{
----	-----	---	----	---	-----	---	----	---	----	---	----	---	----

* The `underscore` package redefines “`_`” to produce an underscore in text mode (i.e., it makes it unnecessary to escape the underscore character).

(

)

\rrparenthesis

TABLE 2: Predefined L^AT_EX 2_E Text-mode Commands

^	\textasciicircum*	<	\textless
~	\textasciitilde*	a	\textordfeminine
*	\textasteriskcentered	o	\textordmasculine
\	\textbackslash	\P	\textparagraph†
	\textbar	.	\textperiodcentered
	\textbardbl	\%oo	\textpertenthousand
○	\textbigcircle	\%o	\textperthousand
{	\textbraceleft†	\`	\textquestiondown
}	\textbraceright†	“	\textquotedblleft
•	\textbullet	”	\textquotedblright
©	\textcopyright†	‘	\textquoteright
†	\textdagger†	,	\textquoteright
‡	\textdaggerdbl†	\R\ \R	\textregistered
\$	\textdollar†	\§\ \§	\textsection†
...	\textellipsis†	\£\ \£	\textsterling†
—	\textemdash	TM\ TM	\texttrademark
–	\textendash	–	\textunderscore†
¡	\textexclamdown	—	\textvisiblespace
>	\textgreater		

The first symbol column represents the—sometimes “faked”—symbol that L^AT_EX 2_E provides by default. The second symbol column represents the symbol as redefined by `textcomp` (if `textcomp` redefines it). The `textcomp` package is generally required to typeset Table 2’s symbols in italic, and some symbols additionally require the T1 font encoding for italic.

* \^{} and \~{} can be used instead of \textasciicircum and \textasciitilde. See the discussion of “~” on page 271.



A First Document

To learn more about LaTeX command:

<https://www.dickimaw-books.com/latex/novices/html/symbols.html>

```
% Preamble to declare 1) a type of document and 2) packages used in the document
\documentclass[a4paper,twocolumn]{article} %Always required
%
%-----%
\usepackage{comment} %To use a block comment in a document
\begin{comment}
Test
a block comment
\end{comment}
%
\usepackage{fontspec} %Either Xelatex or Lualatex is required as a default complier
%To learn more : https://ctan.org/pkg/fontspec?lang=en
%
\title{This is a title of my first document} %To declare a document title and an author(s)
%\author{Firstname Lastname}
%\author{Firstname2 Lastname2}
%To learn more about LaTeX command https://www.dickimaw-books.com/latex/novices/html/symbols.html
\author{
    LastName1, FirstName1\\
    \texttt{first1.last1@xxxxx.com}
    %\texttt{first1.last1@xxxxx.com} is used to produce text-mode in typewriter font within a mathematical expression
    \and
    LastName2, FirstName2\\
    \texttt{first2.last2@xxxxx.com}
}
%
%=====
% Main Document
\begin{document}
\maketitle
%Put your text/context in the body of your document here...
Hello World
\end{document}
```



LaTeX Tutorials

Books:

- Nambudiripad, K. B. M. 2014. *Latex for Beginners*. Alpha Science International.
- Kottwitz, S. 2015. *LaTeX cookbook: over 90 hands-on recipes for quickly preparing LaTeX documents to solve various challenging tasks*. Quick answers to common problems. Birmingham: Packt Publishing.

Online Quick Tutorials:

- <https://latex-tutorial.com/>
- <https://www.overleaf.com/learn>
- <https://www.javatpoint.com/latex>



Essential Formatting in LaTeX

1. Text Formatting: **Bold**, *Italics*, and Underline
2. Lists
3. Alignments (Left, Center, Right)
4. Adding a picture(s)

Week#3

5. Math Typesetting
6. Adding a table (s)
7. Table of Context
8. Bibliography

Week#4

9. EGCO Template

Week#5



Textformatting: Bold, *Italics*, and Underlining

Bold: \textbf{...}

Italics: \textit{...}

Underline: \underline{...}

Example:

My First L^AT_EX Document

Enter an author's name here

April 2023

1 Textformatting (Bold, Italic, and Underline)

BOLD *ITALIC* UNDERLINE

```
\documentclass[11pt, a4paper]{article}
% Fontsize 10-12pt is applicable for article

\title{My First LaTeX Document}
\author{Enter an author's name here} %Replace your name here
\date{April 2023}

\begin{document}
\maketitle
\section*{Textformatting (Bold, Italic, and Underline)}
%Remove '*' after \section command to add a section
number
\textbf{BOLD} \textit{ITALIC} \underline{UNDERLINE}

\end{document}
```

Exercise: Copy code and check the result if it is the same?



Creating **Lists** in LaTeX

- Unordered lists (Bullets)
- Ordered lists (Numbering List: 1,2,3,...)
- Nested lists
- Changing List-Numbering / Types of Bullets



Unordered lists

1) A default black-dot bullet (•)

```
\begin{itemize}
    \item Your first item (with a black-dot bullet)
    \item Your second item of any length
    \item ...
\end{itemize}
```

2) Changing bullet type

```
\begin{itemize}
    \item[-] Your first item (with a black-dot bullet)
    \item[-] Your second item of any length
    \item[-] ...
\end{itemize}
```



Examples

Output

```
\begin{document}
    \section{Lists}
    \subsection{Unordered Lists}
    \subsubsection*{Unordered Lists with a default dot bullet}
    \begin{itemize}
        \item First item (with a default black-dot bullet)
        \item Second item of any length
        \item Third item
    \end{itemize}
```

1) A default black-dot bullet (•)

2 Lists

2.1 Unordered Lists

- Unordered Lists with a default dot bullet
- First item (with a default black-dot bullet)
 - Second item of any length
 - Third item

```
\subsubsection*{Unordered Lists with a customized bullet}
\begin{itemize}
    \item[-]\textbf{BOLD}
    \item[-]\textit{ITALIC}
    \item[-]\underline{UNDERLINE}
\end{itemize}
```

2) A customized bullet

- Unordered Lists with a customized bullet
- **BOLD**
 - *ITALIC*
 - UNDERLINE

```
\end{document}
```



Ordered List

Default Numbering: 1., 2., 3., ...

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

Examples

1. First item
2. Second item (The list numbers increase automatically)

Changing Types of Numbering:
\roman*, \arabic*, \alph*

Examples

```
\begin{enumerate}[label=(\roman*)]
    \item .....
\end{enumerate}
%
\begin{enumerate}[label=\arabic*]
    \item .....
\end{enumerate}
%
\begin{enumerate}[label=(\alph*)]
    \item .....
\end{enumerate}
```

- | |
|-------------|
| (i) One |
| (ii) Two |
| (iii) Three |
| 1) One |
| 2) Two |
| 3) Three |
| (a) One |
| (b) Two |
| (c) Three |



Nested Lists (Default: a, b, c, ...)

```
\begin{enumerate}
```

```
    \item One
```

```
    \item Two
```

```
        \begin{enumerate}
```

```
            \item Sub-item a
```

```
            \item Sub-item b
```

```
        \end{enumerate}
```

```
    \item Third item
```

```
\end{enumerate}
```

Output

1. One

2. Two

(a) Sub-item a

(b) Sub-item b

3. Third item



Nested Lists (numbering in suborders)

```
\begin{enumerate}
```

```
    \item One
```

```
    \item Two
```

```
        \begin{enumerate} [label*=\\arabic*.]
```

```
            \item Sub-item Two point One
```

```
            \item Sub-item Two point Two
```

```
        \end{enumerate}
```

```
    \item Third item
```

```
\end{enumerate}
```

Output

1. One

2. Two

2.1. Sub-item Two point One

2.2. Sub-item Two point Two

3. Third item



Alignments in LaTeX

- **Standard** built-in commands for text alignments:
 - ragged-right (`\raggedright`)
 - ragged-left (`\raggedleft`)
 - centerd (`\centering`)
- **ragged2e** package provides better text refinements:
 - ragged-right (flushleft environment)
 - ragged-left (flushright environment)
 - centerd (centering environment)



Alignments in LaTeX (Cont.)

Standard built-in commands

Environment	LaTeX command
center	\centering
flushleft	\raggedright
flushright	\raggedleft
justify	\justifying

Example

```
\begin{flushleft}  
    <text, which is set ragged-right>  
\end{flushleft}
```

ragged2e package

Environment	LaTeX command
Center	\Centering
FlushLeft	\RaggedRight
FlushRight	\RaggedLeft
Justify	\Justifying

Example

```
\begin{FlushLeft}  
    <text, which is set ragged-right>  
\end{FlushLeft}
```



Examples

Standard LaTeX Alignment:

```
\subsection{Right-aligned example with  
\texttt{\string\raggedright}\\" (standard \LaTeX{} command)}
```

```
% ---
```

```
\begin{flushleft} %compatible with \begin{raggedright}  
    \noindent  
    \blindtext[1]\par  
\end{flushleft} %compatible with \end{raggedright}
```

```
% --- Alternative ---
```

```
%\raggedright\blindtext[1]\par  
% This affects the rest of the document
```

Ragged2e:

```
\subsection{Right-aligned example with  
\texttt{\string\RaggedRight}\\" (ragged2e package)}
```

```
% ---
```

```
\begin{FlushLeft} %compatible with \begin{FlushLeft}  
    \noindent  
    \blindtext[1]\par  
\end{FlushLeft} %compatible with \end{RaggedRight}
```

```
% --- Alternative ---
```

```
%\RaggedRight\blindtext[1]\par
```



Examples: *Output*

Standard LaTeX Alignment:

3.1 Right-aligned example with `\raggedright` (standard LaTeX command)

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Ragged2e:

3.2 Right-aligned example with `\RaggedRight` (ragged2e package)

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Image/Figure

- 1) Insertion
- 2) Captions, Labels, Position
- 3) Subfigures
- 4) Cross Reference



Image/Figure Insertion, Caption, Label, and Position

Standard graphics: `\includegraphics[width=XXX]{file_name}`

A new environment to determine position of the figure

Parameter Position

<code>h</code>	Place the float <i>here</i> , i.e., <i>approximately</i> at the same point it occurs in the source text (however, not <i>exactly</i> at the spot)
<code>t</code>	Position at the <i>top</i> of the page.
<code>b</code>	Position at the <i>bottom</i> of the page.
<code>p</code>	Put on a special <i>page</i> for floats only.
<code>!</code>	Override internal parameters LaTeX uses for determining "good" float positions.
<code>H</code>	Places the float at precisely the location in the LATEX code. Requires the float package, though may cause problems occasionally. This is somewhat equivalent to <code>h</code> .

```
\usepackage{graphicx} % Required for inserting images
\graphicspath{{Figures/}} % Required if the image(s) is not in the same folder of TeX file
\begin{figure}[!h]
    \noindent\Centering
    \includegraphics[width=0.25\textwidth]{MU_LOGO_Color}\\
    \caption{Mahidol University.}
    \label{fig:MU Logo}
\end{figure}
```

Tip! By default, LaTeX typically puts the picture where it finds sufficient space

The graphic is scaled to the width

`"textwidth, \columnwidth":`
`"linewidth"`
% space varies by local environment
(e.g., under lists)



Example

```
\documentclass[11pt, a4paper]{article}
\usepackage{graphicx} % Required for inserting images
\graphicspath{{Figures/}} %Path of the images if not where TeX file is
\begin{document}
\section{Adding an image}
\begin{figure}[!h]
\noindent\Centering
% Add figures
\includegraphics[width=0.25\textwidth]{MU_LOGO_Color}\\
\caption{Mahidol University.}
\label{fig:MU Logo}
\end{figure}
%\includegraphics[width=0.25\textwidth]{MU_LOGO_Color}\\
%justified is used as a default alignment
\noindent\textbf{Mahidol University International College}\\
(\textbf{MUIC}) 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.\\
MU Logo is shown in figure~\ref{fig:MU Logo}.
\end{document}
```

Output

4 Adding an image



Figure 1: Mahidol University.

Mahidol University International College 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.

Q: How to refer to fig:MU Logo?
A: ~\ref{fig:MU Logo}



Subfigures

```
\usepackage{subcaption} %required for subfigures
\begin{document}
\section{Subfigures}
\begin{figure}[h!]
\centering
\begin{subfigure}[b]{0.3\linewidth}
\includegraphics[width=\linewidth]{MU_LOGO_Color}
\caption{}
\end{subfigure}
\hspace{1em} % Space between image A and B; 1em = Font size
\begin{subfigure}[b]{0.3\linewidth}
\includegraphics[width=\linewidth]{MU_LOGO_BW}
\caption{}
\end{subfigure}
\caption{MU Logo - (a) Color (b) Black\&White}
\label{fig:MU Logo}
\end{figure}
\end{document}
```

Output

6 Subfigures



Figure 3: MU Logo (a) Color (b) Black&White



Cross Reference

There are three commands that generate cross-references in this example.

\label{fig: Fig_RefName}

This will set a label for this figure. Since labels can be used in several types of elements within the document, it's a good practice to use a prefix, such as fig: in the example.

\ref{fig: Fig_RefName}

This command will insert the number assigned to the figure. It's automatically generated and will be updated if insert some other figure before the referenced one.

\pageref{fig: Fig_RefName}

This prints out the page number where the referenced image appears.

The **\caption** is **mandatory** to reference a figure.

To generate a list of figures, use **\listoffigures** command

List of Figures

1	Mahidol University	1
2	An image from a different path/folder of the TeX file	1
3	MU Logo (a) Color (b) MB&W	2

If you want “Figure” as prefic in table of figure, use the following commands in preamble:

\usepackage{tocloft}

\renewcommand{\cftfigpresnum}{Figure }

\setlength{\cftfignumwidth}{3.7em}

List of Figures

Figure 1	Mahidol University	5
Figure 2	An image from a different path/folder of the TeX file	5
Figure 3	MU Logo (a) Color (b) MB&W	5



Table of Contents

Use **\tableofcontents** command in the main document where you like to insert it

Example

```
% Main Document ---  
\begin{document}  
...  
\pagebreak  
\tableofcontents  
...  
\end{document}
```

Output

Contents

4 Adding a figure	1
5 Adding an image from a different folder	1
6 Subfigures	2

END

