GEN 600: Technical Writing

LaTex
Part II

Outline

- Working with packages
- Math and Equations
- Revisiting Figures
- Revisiting Tables
- Bibliography and citations
- Templates

Using packages

- Packages add new functions and features to LaTeX, they are included in the **preamble** (the part before \begin{document} ..)
- Most packages will already be installed by default with any editor but some may need installation
- There are many packages for different purposes, already we used "***graphicx***" package in Part I to include graphics files.
- Command to use in the preamble:
  - **\usepackage[options]{packagename}**

Example Packages

- \usepackage{color}: to use colorful text (black,red, green, blue, cyan, magenta, yellow and white)
  - {\color{red}red text}
- \usepackage{fancyhdr}: to customizes headers and footers
  -

```
\pagestyle{fancy}
\lhead{LaTex - Part2}
\chead{\textit{Technical Writing}}
\rhead{GEN600}
\lfoot{Farida Sabry}
\cfoot{}
\rfoot{\thepage}
\renewcommand{\headrulewidth}{0.4pt}
\renewcommand{\footrulewidth}{0.4pt}
```

- \usepackage{setspace}: to provide easy way to change linespacing
  - \doublespacing , \onehalfspacing, \singlespacing

More Packages

- \usepackage{acronym}:ensures that all acronyms used in the text are spelled out in full at least once. It also provides an environment to build a list of acronyms used.
- \usepackage{hyperref} to add hyperlinks
  - \href{URL}
- \usepackage{pgfplots} to add plots from tables
- \usepackage{listings} for code highlighting
- :
- :
- Packages archive (>5000): https://ctan.org/

Math and Equations

- **Inline math:** to write mathematical formula within text put it between $ $ or \(.. \) :
  - This formula $ f(x)= x^2 $ is an example.

This formula $f(x) = x^2$ is an example.

- **Display math mode:**
  - Use \[...\]
  - Equation environment

```
\begin{equation}
f(x) = \sum_{i=1}^{N} x_i
\end{equation}
```

Math symbols and special characters

- Subscripts and superscripts are produced with _ and ^ in any math mode.
- Fractions are produced by the \frac command: \frac{numerator}{denominator}
- Some commands for mathematical symbols:
  - \sum, \int, \infty, \Rightarrow, \surd, \bigotimes, \alpha, \beta, \gamma, \delta, \Delta, \pi, \chi, \omega ….. a comprehensive list can be find here or you can draw your symbol here to find the corresponding Tex command to use 
- Arrays to be used for matrices, determinants or set of equations are produced by the array environment (or alternatively matrix environment
  - The commands \left and \right produce delimiters that grow as large as needed. (, | , [, \{

Math (Cont'd)

- To adjust spacing:
  - \, thin space, \: medium space, \! negative thin space, \; thick space
- To adjust font in math mode:
  - \mathbf, \mathit, \mathcal, \mathtt, \mathsf, \mathrm :

    changes style only of letters, numbers, and uppercase Greek letters. Use \boldmath to make symbols bold within \mbox or toggle it after using, with \unboldmath.
- To add mathematical alphabet symbols like $\mathbb{E}$
  - Use \mathbb{E} from amsfonts / amssymb package

Multi-line Formulas

- Use split environment
- Use “amsmath” package
  - align (numbered) or align* (unnumbered) environment

Exercise: Write LaTex

- A numbered equation

$$F(x,y) = 0 \quad \text{and} \quad \begin{vmatrix} F''_{xx} & F''_{xy} & F'_x \\ F''_{yx} & F''_{yy} & F'_y \\ F'_x & F'_y & 0 \end{vmatrix} = 0$$

- A table named “Gaussian Distribution”

Written as	$f(x)$	$\mathbb{E}[X]$	mode	$\mathrm{var}[X]$
$X \sim \mathcal{N}(\mu, \sigma^2)$	$\frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{1}{2\sigma^2}(x-\mu)^2}$	μ	μ	σ^2

Figures (revisited)

- Last time we used the figure environment and the graphicx package.
- \graphicspath{{img/}}
- Adding multiple images to the same figure
  - use subfigure environment and subcaption package

Tables (revisited)

- Decimal points alignment
  - \usepackage{siunitx} % Required for alignment
- Cells spanning multiple rows/columns
  - \usepackage{multirow}
  - \multirow{NUMBER_OF_COLUMNS}{WIDTH}{CONTENT}
  - \multicolumn{NUMBER_OF_COLUMNS}{ALIGNMENT}{CONTENT}
- Multipages table
  - \usepackage{longtable} and longtable environment so that they are not cropped at the end of a page
- Landscape tables
  - \usepackage{rotating} and sideways table environment
- From Comma Separated Value Files (csv)
  - \usepackage{pgfplotstable}
  - Does only work for tables smaller than one page
  - For more options, check this

Bibliography and referencing

- Citations are created from a **.bib file**
- **Bib files** contain information regarding the citation material e.g. title, journal, volume, issue, pages, etc.
- .bib files can be written manually or can be exported from different journals websites or extracted automatically using one of the papers management software like Mendeley / Citavi / EndNote …
- Example for .bib file in gen600_Part2.zip files
  - It uses @article, @book, @inproceedings , @phdthesis … to define entries in the bibliography

Bibliography and referencing

- Use the following two commands to include your bibliography cited references
  - \bibliographystyle{stylename}; stylename values can be plain, acm, ieeetr, unsrt, ..etc
  - \bibliography{./LatexBibliography.bib}
- To cite a reference within paper text use \cite{citationkey}
  - Citationkey is the first unique value that identify the bib item
- To add it to the table of contents
  - \addcontentsline{toc}{section}{References}

Templates

- Way to customize formatting a paper and putting standardized rules for its writing (setting margins, fonts, and font sizes for different parts, defining environments and variables ….).
- Document class (*.cls)
- Programming-like commands.
- You can define your own template file.
- You will find templates for most of the conferences and journals, and theses templates (You will find Faculty of Engineering, Cairo University thesis template on the course page).

References and links

- Lamport User Guide
- http://www.stat.pitt.edu/stoffer/freetex/latex%20basics.pdf
- http://ftp.cc.uoc.gr/mirrors/CTAN/info/symbols/comprehensive/symbols-a4.pdf

Exercise

- Add multi-images figure and look how to add captions for these subfigures
- Add a table from a csv file in a landscape
- Add two references to a bib file and cite them in text.

Assignment 2

- Announced on the website
- Due: 20th April 2018