A Concise Introduction to LaTeX

Henry Yip
betelgeuse0125@gmail.com

August 16, 2022

Abstract

LaTeXis the formal format of submitting essays. No matter if you are a life science people or a physical science people you should most definitely learn the basics

0 Disclaimer

- This document contains some math equations, extracted from my Astrophysics Notes. I have gained permission from Catherine Heymans from the University of Edinburgh to put it in my personal website.

1 Initialization

- Go to the login page of Overleaf
- Create a New Account [1]
- Press **New Project**
- Press **Blank Project** and enter your title

[1] You'll likely obtain a professional account if you login with your University Email, however, the differences are minimal, but auto-Github updates can be handy at times

2 Preample

- Below is an example of a **Preample**

```
\documentclass{article}
\usepackage{amsmath}
\usepackage{amssymb}
\usepackage{parskip}
\usepackage [utf8] {inputenc}
\usepackage{titlesec}
\setcounter{secnumdepth}{4}
\titleformat{\paragraph}
{\normalfont\normalsize\bfseries}{\theparagraph}{1em}{}
\titlespacing*{\paragraph}
{0pt}{3.25ex plus 1ex minus .2ex}{1.5ex plus .2ex}
\newcommand{\ie}{\textit{i}.\textit{e}. }
\title{Introductory Astrophysics (PHYS08050) Notes}
\author{Henry Yip
s2231321@ed.ac.uk
}
```

2.1 Documentclass

- On the first line you can see **\documentclass{}**. As we are writing articles, we always put **\documentclass{articles}** in the brackets. If you want to include a report later on, you should put **\documentclass{report}** [2]

2.2 Packages

- Packages are extensions of LaTeXthat allows you to to include all sorts of things, like graphs, hyperlinks, math symbols and so on

2.2.1 Math Articles

- **\usepackage{amsmath}** and **\usepackage{amssymb}** are almost always required.
- **Tikz** is preferred if you want to draw graphs

2.3 Non-Math Articles

- You can include hyperlinks through **\usepackage{href}**
- There are pretty much all sorts of packages anywhere. For example, the \usepackage{parskip}
- You can **always** find your answer in Stackexchange

[2] If you want to write a LaTeXtutorial on your own, remember that you can't just type the bolded words because the compiler would be ultra confused. Instead, search "escape characters" online and you'll see!

3 Title, Author and Date

- The Sample document has **Sample** as the default title, feel free to change to anything you want
- You can include several authors if you use the and function.
- \\allows you to skip lines
- For the date, set as today
- After all these, start the document by **\begin{document}**. Remember to **\end{document}** when you finish
- Always include **\maketitle** after **\begin{document}**

4 Abstract

- You can include an Abstract by **\begin{abstract}**
- This can only be added after **\begin{document}**
- Always remember to **\end{abstract}**

5 Math Symbols

- One should search online for the math symbols supported by LaTeX. Here is a good guide
- More symbols can be downloaded through extra packages. For example, $\hbar$, $\measuredangle$
- a $ sign is **required** to show that you are entering math mode. For example: $\measuredangle$ will show as $\measuredangle$
- You can make your equations aligned also: (Please See Disclaimer!)

$$\Delta K = \frac{dK}{dR}\Delta R \tag{1}$$
$$= -\frac{GM\Delta m}{2R^2}\Delta R \tag{2}$$

$$\Delta U = \frac{dU}{dR}\Delta R \tag{3}$$
$$= -\frac{GM\Delta m}{R^2}\Delta R \tag{4}$$

$$\frac{\Delta K}{\Delta U} = \frac{-\frac{GM\Delta m}{2R^2}\Delta R}{-\frac{GM\Delta m}{R^2}\Delta R} \tag{5}$$

$$= \frac{1}{2} \tag{6}$$

- You can use the \begin{align} and \end{align} to achieve this. Remember to include a & before every = sign so equations can be actually aligned
- Below is an example:

```
\begin{align}
\Delta U& =\dfrac{dU}{dR} \Delta R\\
&=-\frac{GM\Delta m}{R^2} \Delta R
\end{align}
```

- You can find more in Overleaf's website

6 Inserting Images

- ¡1-¿ First, upload your images to **Overleaf**
- ¡2-¿ Second, include this line:
  - \includegraphics[scale= 1]{Preample.png}
- As for how to rotate images, align images, please check out this link

7 Hyperlinks

- First include the following packages in the **preamble**

```
\usepackage{hyperref}
\hypersetup{
    colorlinks=true,
    linkcolor=blue,
    filecolor=magenta,
    urlcolor=cyan,
    pdftitle={Overleaf Example},
    pdfpagemode=FullScreen,
    }
```

- Obviously, change the colours as you like
- Whenever you use hyperlink, type: \href{Your URL}{**the text**}
- Below is an example:

```
\begin{itemize}
\item Go to \href{https://www.overleaf.com/login}{the login page of Overleaf}
\item Create a New Account \footnote{You'll likely obtain a professional acco
```

- You can see the result above!

8 Footnote

- Just type down \footnote {}
- The formatting is automatic

9 Fonts

9.1 Bolding

- I almost always use \textbf {}
- There are all sorts of strange commands you can find online, and some honestly sucks
- You can read this for more details [3]
-
- Below I will compare fonts from bf, textbf and bfseries. To be honest, to me it looks the same, but they are used in **very** different contexts
- **bf**
- **textbf**
- **bfseries**

9.2 *Italics*

- I only use \textit
- Below I will compare fonts from Textit, itshape and it. To be honest, again, to me it looks the same, but they are used in different contexts
- *textit*
- *itshape*
- *it*

9.3 *Nested Commands*

- The below are from comments in 2012, I am not sure if it's the same now
- \it and \bf do not support nesting
- \textit and \textbf supports nesting

[3] This thread is 11 years old already

9.4 Tables

- You can make very nice tables with LaTeX

Time	Activity	Remarks
7:00	Train in **Glascow**/Paris	
12:00	Arriving in **King's Cross Station**	
12:30	Check in	
13:00-14:00	Lunch	
15:00-18:45	Hong Kong Disneyland	Walk Around
19:15-20:45	Dinner	

- You should type like this:

```
\begin{table}[H]
  \begin{center}
    \begin{tabular}{c|c|c}
      \textbf{Time} & \textbf{Activity}&\textbf{Remarks}\\
      \hline\hline
      7:00 & Train in \textbf{Glascow}/Paris& \\
      \hline
      12:00 & Arriving in \textbf{King's Cross Station}&\\
      \hline
      12:30 & Check in & \\
      \hline
      13:00-14:00 & Lunch \\
      \hline
      15:00-18:45 & Hong Kong Disneyland & Walk Around\\
      \hline
      19:15-20:45 & Dinner &\\
      \hline

    \end{tabular}
  \end{center}
\end{table}
```

- To adjust position please download \usepackage{float}

10 Bonus Session: Downloading PDF for TexMaker users

- I understand that most of you are Overleaf users, but this section is for TexMaker users
- Save your document as astrophysics.tex. Download MikTeX (The Source Code is available in GitHub), go to comamnd prompt and cd to the place you stored your tex file
- Then type **pdflatex nameofyourdocument.tex**
- You can also click "View" in TexMaker, then "print" and then "Microsoft Print to Pdf". However, at least for me, the hyperlinks may be lost.

11 Conclusion

LaTeXis a visually stunning and user-friendly. If you have any problems, feel free to **contact me through betelgeuse0125@gmail.com** or **whatsapp** me