InsuLink

Documentation

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This file was created for the benefit of

SECTION 1

Idea

When Type 1 Diabetes[1] is diagnosed, a patient starts a new life with different eyes. From now on, the conception of food is completely different from the normal one, and the patient has to assimilate the big change and learn how to handle the disease. One of the most difficult but at the same time important things that the patient must learn, is the ***carbohydrates count*** and subsequently the correct insulin dose for a bolus [2]. InsuLink has been designed with the main purpose of giving an hand to Type 1 Diabetes patient with the calculation of the correct ***insulin doses*** and storing Glycemia values.

1.1 Main Goal

InsuLink main goal is to give a first support to the patient but only if combined with the doctor supervision. It is important to underline that this application is only defined by an algorithm, and in this kind of diseases ***each patient needs ad hoc treatments***.

```
\usepackage
```

or

```
\usepackage{package}
```

SECTION 2

Functionalities

Insulink offers some useful tools to keep track of the daily routine of a patient.

2.1 Food Scan

It is possible to to scan a given Food BarCode and be redirectd to the FoodDetails page with all necessary data.

2.2 Glycemia

Keep track of your daily Glycemia with intuitive charts and easly with the glycemia insertion tool.

2.3 Insulin Calculator

An algorithm (inside Insulin Calculator class) will retrieve last Glycemia, total amount of carbohydrates, sport activity and all essential data to calculate the optimal insulin dose for the given meal. A more detailed explaintation can be fount in the Insulin Calculator Section —/cite section—.

2.4 Calendar

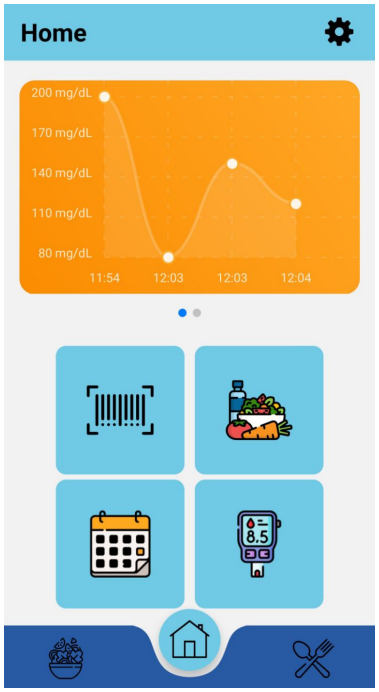
The user can see a well detailed sight of all previous data, just choosing a date from the InsuLink calendar, that will retrieve all the informations about that day from the database.

SECTION 3

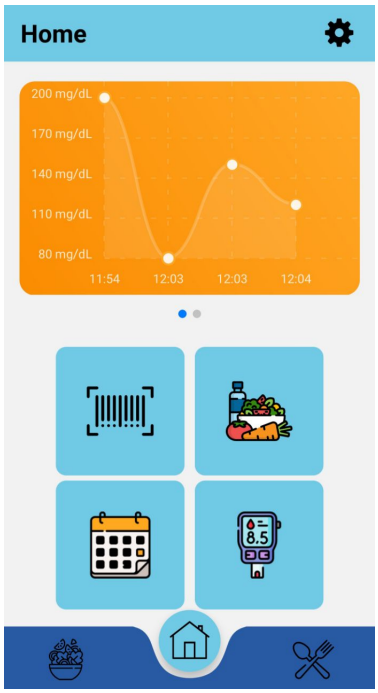
Screens and Navigation

The following provides a screenshot of the pages with a brief description of their use.

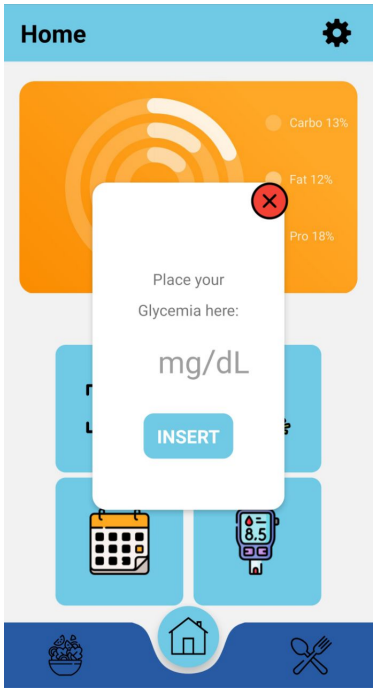
3.1 Home



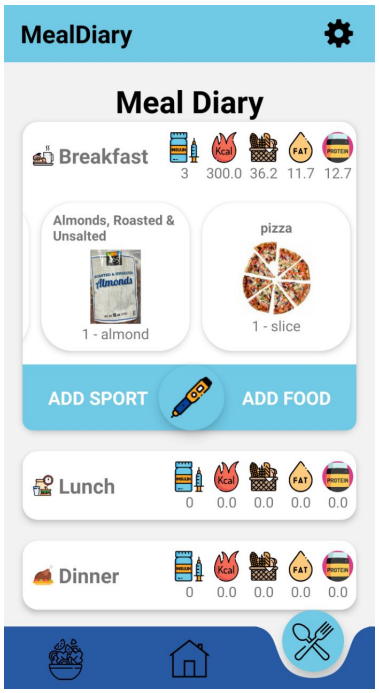
3.2 Search



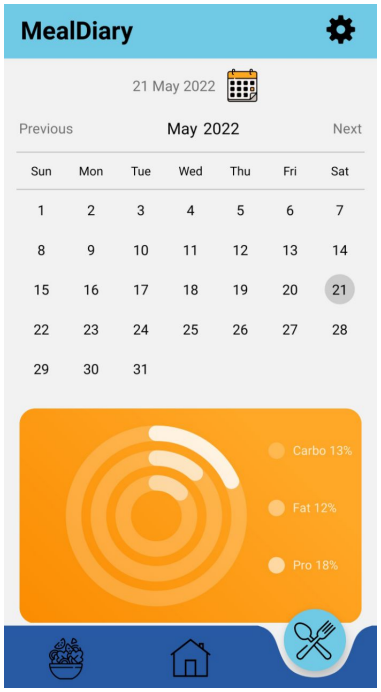
3.3 Glycemia PopUp



3.4 Meal Diary



3.5 Calendar

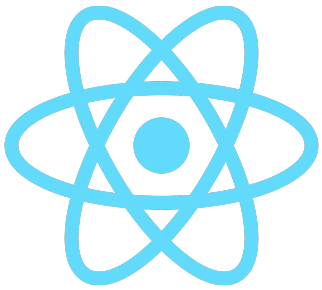


In calendar it will be possible to retrieve historical data by clicking on a date.

4

SECTION

Architecture



The technology used to make this app is react native [3].

4.1 Folder Structure

`\assets`

Contains all images and component with a proper mapping.

`\constants`

All constants concerning the design and states of the app.

`\customComponents`

All buttons, charts and pickers specifically designed for the pages.

`\pages`

Folder with all pages of the app, using the custom components

`\stateManager`

Redux States for data managing with actions and reducers: macroTracker for meals and userReducer for the patient.

`\utils`

Logic of API, authentication, Firebase and Insuline Calculator

5

SECTION

API doc

5.1 Nutritionix

Nutritionix [4] is the API used to have a food database-

5.2 Firebase

6

SECTION

Redux States

The following subsections are lists and examples of pre-defined macros or commands. Creating a macro in latex is effectively similar to creating a shortcut. Macros allow for a cleaner, more efficient process of writing the code for your document.
Macros are great for repetitive elements and texts that you carry across several documents.

6.1 Main Box Environments

6.1.1 Theorems

```
\begin{theo}
 ⟨text⟩
\end{theo}
```

This environment `\begin{Theo}` inserts a new yellow theorem box with a black frame into the document.

6.1.2 Boxes for Definitions

```
\begin{definition}
 ⟨text⟩
\end{definition}
```

This environment `\begin{definition}` inserts a regular definition into the document.

6.1.3 Boxes for Examples

```
\begin{example}{title}
 ⟨text⟩
\end{example}
```

This environment `\begin{example}` creates a regular example box.
After inserting the question for the specified example, make sure to use the command `\tcbline` or `\tcblower`. This command creates a dashed line within the example box or any pre-created box and allows for you to created a specified space for the students to fill in the solution.

```
\begin{longexample}{title}
 ⟨text⟩
\end{longexample}
```

Environment for creating examples inside lessons whose text is quite lengthy or the example requires a good amount of work or drawing.
If one wants to extend the box of the height further that the default value, go to the lesson.tex file inside of the lessons folder. Once inside of the lesson.tex file, go down to about line 136, inside the examstyle./style, and change the height from 9.5cm to your preferred value.

6.1.4 Boxes for Discussions

```
\begin{discussion}{title}
 ⟨text⟩
\end{discussion}
```

This environment inserts a box similar to the example box just instead labeled discussion. Similar to the example box as well, after inserting the question or text, make sure to use the command `\tcbline`. This command will create a dashed line within the box and allows for you to created a specified space for the students to fill in the solution or drawing etc. preferred value.

6.1.5 Boxes for Visualizations

```
\begin{visualization}{title}
 ⟨text⟩
\end{visualization}
```

This environment inserts a box similar to the example and discussion boxes just instead for visualizations.

6.2 Extra Box Environment

```
\begin{DashedDefinition}
 ⟨text⟩
\end{DashedDefinition}
```

This command offers another option for a definition box just with a dashed frame.

```
\begin{DashedDefinition}{}
[A partial derivative of a function of several variables is its derivative with
    respect to one of those variables, with the others held constant. Partial
    derivatives are used in vector calculus and differential geometry.
\end{DashedDefinition}
```

Definition 6.2.1

A partial derivative of a function of several variables is its derivative with respect to one of those variables, with the others held constant. Partial derivatives are used in vector calculus and differential geometry.

```
\vspace{1mm}
\begin{visualization}[\quad \large Angular Momentum \hspace{3mm}]
Discuss an alternate way of using the conservation of angular momentum for
    satellite orbits and any other point masses moving in a circle.
\tcbline
\end{visualization}
\vspace{1mm}
```

Visualization 6.1 **Angular Momentum**

Discuss an alternate way of using the conservation of angular momentum for satellite orbits and any other point masses moving in a circle.

```
\begin{example2}
\vspace{1mm}
A partial derivative of a function of several variables is its derivative with
   respect to one of those variables, with the others held constant. Partial
   derivatives are used in vector calculus and differential geometry.
\tcbline
\end{example2}
```

Example 6.1

A partial derivative of a function of several variables is its derivative with respect to one of those variables, with the others held constant. Partial derivatives are used in vector calculus and differential geometry.

```
\begin{example}[\quad \large Rotational Motion]
Now assume the small pulley has rotational inertia.
\begin{enumerate}
\item Will your answers be different? Why?
\item How does the angular velocity of the rotating apparatus and the linear
   velocity of the falling mass compare to the previous case?
\item How does the torque exerted by the string on the rotating apparatus change
   the angular momentum of the apparatus?
\end{enumerate}
\tcbline
\vspace{1mm}
\solution
\end{example}
```

Example 6.1 **Rotational Motion**

Now assume the small pulley has rotational inertia.

1. Will your answers be different? Why?
2. How does the angular velocity of the rotating apparatus and the linear velocity of the falling mass compare to the previous case?
3. How does the torque exerted by the string on the rotating apparatus change the angular momentum of the apparatus?

Solution:

```
\begin{longexample}[\quad \large Rotational Motion]
A block of mass $4m$ is attached to a light string and passes over a pulley with
   negligible rotational inertia and is wrapped around a vertical pole of radius
   $r$.  The block is then released from rest, causing the string to unwind and the
   vertical pole it is wrapped around to rotate.  On top of the vertical pole lies
   a horizontal rod of length $2L$ with block2s of mass $m$ attached to both ends.
   The rotational inertia of this apparatus is $2mL^2$.
\begin{enumerate}
\item What is the tension in the string in terms of the acceleration of the falling
   block?
\item What is the torque exerted on the rotating pole by the string in terms of the
   acceleration of the falling block?
\item When the large block has fallen a distance $D$, what is the instantaneous
   rotational kinetic energy of the apparatus?
\end{enumerate}
\tcblower
\vspace{1mm}
\solution
\end{longexample}
```

Example 6.1 **Rotational Motion**

A block of mass $4m$ is attached to a light string and passes over a pulley with negligible rotational inertia and is wrapped around a vertical pole of radius r. The block is then released from rest, causing the string to unwind and the vertical pole it is wrapped around to rotate. On top of the vertical pole lies a horizontal rod of length $2L$ with block2s of mass m attached to both ends. The rotational inertia of this apparatus is $2mL^2$.

1. What is the tension in the string in terms of the acceleration of the falling block?
2. What is the torque exerted on the rotating pole by the string in terms of the acceleration of the falling block?
3. When the large block has fallen a distance D, what is the instantaneous rotational kinetic energy of the apparatus?

Solution:

6.3 Extra Box Commands

`\tcbline or tcblower`

Creates a dashed line within the box. Useful for creating a specified portion for students to write their answer down.

`\solution`

Inserts the word solution in red font.

6.4 Commands (Macros)

`\contactinfo`

Allows for a quicker way to input contact information through several documents.
To insert contact information, put the following in your preamble:
`\newcommand{\contactinfo}{Insert info here.}`

`\fillin`

Allows for a quicker way to input a line for students to fill in the notes.

6.5 How to Define New Commands (Macros) and Colors

`\newcommand{\name}{\action}`

The command `\newcommand` allows the user to effectively use a shortcut for a given action. Allows for a cleaner, more organized code. When creating a new command, make sure to put it in the preamble of you document.

`\definecolor{name for color}{rgb}`

The `\definecolor` command allows for the user to define new colors to be used in the document. For the rgb values of different colors, go to latexcolor.com.

7

SECTION

Insulin Calculator

Inserting graphics in your document requires the **graphicx package**, which you can find in the folder that accompanied this guide.

7.1 Easiest Way to Insert Images

The easiest, most straightforward way I have found so far to insert images into your LaTeX document is through TeX Studios include graphics feature. This features allows you to bypass having to constantly type and communicate with your computer where the folder containing your images is located. This really comes in handy once one has created several latex documents across several folders. If you decide to insert images through this method, as I presume most of those reading this will, **make sure to remove the graphics path command from the preamble of the templates in the folder containing this pdf.**

So to insert an image into your LaTeX file, go to the taskbar located at the top of your screen and click the menu labeled **LaTeX**. Inside the LaTeX dropdown, go down to **Input/Include Files** and then **includegraphics**. Once there, find where you put the image you wanted to insert into your document and then press ok.

7.2 Graphics Path

Most of the time, it will easier to insert images into a file using the method we mentioned in the previous subsection. However, the following allows for a cleaner, more organized, but a little more complicated at times possibly more advanced way to insert images into your LaTeX file.

```
\graphicspath{path}
```

This command prevents you from having to tell the computer where the image is stored each time you wanted to insert an image.
The easiest way to set up the graphicspath is to create a folder where you store all the images you want to use and label it **images**. You put this folder in the same area where you write your files. Then you input the following at the beginning of your document:

```
\graphicspath{{./images/}}
```

7.3 Inserting Images

Once you have set up the graphics path from above, you insert pictures by using the following command:

`\includegraphics{`*file-name*`}`

This command allows you to actually insert the image in the document. To alter the position and size of the image, see https://www.overleaf.com/learn/latex/Inserting_Images.

To change the scale of file, use the following

```
\includegraphics[scale= ]{image file name}
```

7.4 Image Additions

`\caption{`*text*`}`

Allows you to add a caption to an image.

```
\begin{wrapfigure}
 ⟨text⟩
\end{wrapfigure}
```

Allows you to wrap an image inside text. For more on this, see the wrapfigure.pdf inside the wrapfigure folder.

7.5 Positioning an Image

To alter an images position: see https://www.overleaf.com/learn/latex/Inserting_Images

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SECTION

Testing

8.1 Font Types

`\textit{...}`	*italic*	Italic shape, used mostly for emphasis.
`\textsl{...}`	*slanted*	Slanted shape, a bit different from italic.
`\textsc{...}`	SMALL CAPS	Small caps shape, use sparingly.
`\textup{...}`	upright	Upright shape, usually the default.
`\textbf{...}`	**boldface**	Boldface series, often used for headings.
`\textmd{...}`	medium	Medium series, usually the default.
`\textrm{...}`	roman	Roman family, usually the default.
`\textsf{...}`	sans serif	Sans Serif family, used for posters, etc.
`\texttt{...}`	`typewriter`	Typewriter family, fixed-pitch characters.
`\emph{...}`	*emphasized*	Use for emphasis, usually changes to italic.

9

SECTION

Referencing and Documentation

9.1 References/Hyperlinks and Formatting

`\label{`*link*`}`

In order to refer to make a cross-reference within a document, you first must label the text/section that you want to refer to.

```
\subsection{Math Tests/Exams and Math Symbols/Functions}\label{mathexams}
```

`\ref{`*label-name*`}`

This command allows you to make a cross-reference to another part of your document.

`\href{`*label-name*`}`

This command is used when the user wants to insert a link that is able to clicked on into a document but want's there to be a placeholder to cover the hyperlink. An example is below.

```
\href{mailto:armindubert19@gmail.com}{basis independent mclean}
```

basis independent mclean

`\fullref{`*label-name*`}`

This command allows you to make a cross-reference to another part of your document. The `\fullref` includes both the section and page number that you are referring to as opposed to the command `\ref` that only refers to the section.

`\url{link}`

This command allows you to insert a link into your document that's able to be clicked on in the pdf you create.

```
\hypersetup{colorlinks,linkcolor=red!50!black,citecolor=blue!50!black,
urlcolor=blue!80!black}
```

This following command makes the links you include in your code/file more appealing by removing the box around the links as well as color coding the different links. This command should be inserted in the preamble of your document.

9.2 Documentation

Documentation and Listings are commands and ways of showing source code side by side with the behavior of the command.
To use documentation in latex, make sure to input `\tcbuselibrary{listings}`.

`\cs`

Allows you to typeset a command without having the command actually played out.

```
\cs{marg}
```

```
\marg
```

`\brackets`

Allows you to put brackets around text that will appear in the document.

```
\cs{brackets}
```

```
\brackets
```

```
\begin{docCommand}
 ⟨text⟩
\end{docCommand}
```

Allows you to identify a command and define what it does, similar to all of the lines with a yellow background in this pdf.

For more on documentation, see tcolorbox.pdf

9.3 Verbatim

To reproduce new lines and spaces exactly as they are in your input file, use the verbatim environment. The verbatim environment prints its text in typewriter-style type and sets it off from the rest of the document with blank lines before and after.

```
\begin{verbatim}
 ⟨text⟩
\end{verbatim}
```

Allows you to identify a command and define what it does, similar to all of the lines with a yellow background in this pdf.

9.4 Source Code for the Documentation Style used in this PDF

The following source code is for the customized environment for the documentation boxes in this pdf.

```
\newtcblisting[auto counter,number within=section]{disexam}{
skin=bicolor,
colback=white!30!beaublue,
colbacklower=white,
colframe=black,
before skip=\medskipamount,
after skip=\medskipamount,
fontlower=\footnotesize,
listing options={style=tcblatex,texcsstyle=*\color{red!70!black}}}
```

10

SECTION

Future Implementations

When it comes to typing symbols, LaTeX has a library that makes it easier to insert symbols into a document. While it does not have all of them, it does provide a good handful them.
To access the library, go to the bottom left corner of LaTeX where one will see the following boxes:
Once you have found this, click the button on the left until you have the white side bar on the left that contains the structure along with some other features. (Note, when you first open LaTeX this sidebar is usually already open. However, I want to make sure users are aware what to do in the case they accidentally close the sidebar).
Once the sidebar is opened, go to the third one down, on the furthest left hand side, which should look something like this:
Once you have clicked on this, feel free to explore some of the symbols inside the library along with the other button features on the sidebar.
If there are some symbols that you regularly and are not contained in that library, check the following symbols in this section or see: https://www.caam.rice.edu/~heinken/latex/symbols.pdf

10.1 Functions

For a comprehensive and detailed guide for Math Functions, see:
https://artofproblemsolving.com/wiki/index.php/LaTeX:Commands

```
\sqrt{abd}
```

$\sqrt{abd}$

```
\sqrt1[n]{abd}
```

Replace `\sqrt1` with `\sqrt`

$\sqrt[n]{abd}$

10.2 Limits, Integrals, Sums, and Fractions

For a more complete instruction on how to write limits, integrals, and sums in latex, see:
https://artofproblemsolving.com/wiki/index.php/LaTeX:Commands

`\int`

```
$\int_{lower}^{upper}$
```

This is the command for creating integrals. Make sure when using to put it in a Math Environment, see section 5.1 on page 10 or put dollar signs on both sides of the integral.

`\dfrac{abc}{xyz}`

```
$\dfrac{abc}{xyz}$
```

$\frac{abc}{xyz}$ This is the command for creating Fractions. Make sure when using to put it in a Math Environment, see section 5.1 on page 10 or put dollar signs on both sides of the fraction.

`\sum`

```
$\sum_{lower}^{upper}$
```

This is the command for creating Summations. Make sure when using to put it in a Math Environment, see section 5.1 on page 10 or put dollar signs on both sides of the Summation.

`\lim`

```
$$\lim_{x\to\infty} f(x)$$
```

$$\lim_{x\to\infty} f(x)$$

This is the command for creating Limits. Make sure when using to put it in a Math Environment, see section 5.1 on page 10 or put two dollar signs on both sides of the limit.

10.2.1 Symbols

`\Delta`

Δ

`\pi`

π

`\theta`

θ

```
\leq
```

$\leq$

```
\geq
```

$\geq$

```
\leqq
```

```
\neq
```

$\neq$

```
\approx
```

$\approx$

11

SECTION

Bibliography

The following environment and command creates a clean and organized bibliography.

```
\begin{thebibliography}{numberofsources}
 ⟨text⟩
\end{thebibliography}
```

The following environment is needed to create the bibliography.

`\bibitem`

The following command creates each source.

11.1 Bibliography Source Code

Spacing is just used to help show the different commands and environments. Do not feel obligated to include the spacing exactly how it is.

```
\begin{thebibliography}{5 % - Number of Sources You are Citing}

\bibitem{financialbrand}Jim, M. (2018). \emph{10 Technologies That
Will Disrupt Financial Services In The Next 5 Years.}\\
Retrieved from:\\
\url{https://thefinancialbrand.com/77228/technology-trends-disrupting
\\-financial-services-banking-future/}

\bibitem{Forbes} Alan, M. (2018). \emph{How Banks Should Navigate
as Their North Star Shifts.}\\
Retrieved from:\\
\url{https://www.forbes.com/sites/alanmcintyre/2018/10/18/how-banks-should-
navigate-through-digital-disruption-as-their-north-star\\-shifts/#39c502223ee7}

\bibitem{americanbanker} Penny, C., Will, H., Suleman, D. (2019). \emph{10 way
technology will change banking in 2019.}\\
Retrieved from:\\
\url{https://www.americanbanker.com/list/10-ways-technology-will-change
-banking\\-in-2019}

\bibitem{Robert Wright} Wright, Robert. (2008). \emph{Origins of Commercial Banking
in the United States, 1781-1830. EH.Net Encyclopedia.}\\
Retrieved from:\\
\url{http://eh.net/encyclopedia/origins-of-commercial-banking-in-the
\\-united-states-1781-1830/}

\bibitem{The Economist} \emph{Tech's raid on the banks.} (2019).
The Economist, 431(9141), 9.

\end{thebibliography}
```

SECTION 12

Miscellaneous

12.1 Rule

`\rule{`*length*`}{`*thickness*`}`

This command inserts a horizontal line with the designated width and thickness.

`\hrulefill`

Inserts a horizontal line that spans the entire width of the page.

`\vrule{`*height*`}{`*thickness*`}`

This command inserts a vertical line with the designated width and thickness.

13

SECTION

Some Common Errors

- A command was misspelled and LATEX doesn't recognize it.
- You have a special character

  `(e.g., &, $, #, %) in the text. Enter these as \&, \$, \# or \%.`

- `Whatever you \begin{...}, you must \end{...}. This includes braces: { ... }.`
- A command was not given all its arguments and is trying to use the rest of the file for an argument.

14

SECTION

Further Reading

14.1 Websites and Tutorials

If you are interested in understanding how Latex really works, I highly encourage reading the following package pdfs/websites/tutorials:
If you are looking for a solution for a problem you have encountered and can not find it within these files, see the templates created in the folder that orignially contained this pdf file or contact me at: armindubert19@gmail.com

14.2 Introduction/Commands/and Overall Good References

14.2.1 Writing First Document

- http://ctan.org/pkg/first-latex-doc

  Writing your first document, with a bit of both text and math.

14.2.2 Brief Introduction/List of Commands

- https://www.scss.tcd.ie/~dwoods/1617/CS1LL2/HT/wk1/commands.pdf

  This online article is an extremely brief reference guide for some Latex Commands.

- https://www.bu.edu/math/files/2013/08/LongTeX1.pdf

  List of several useful commands.

14.2.3 In-Depth LaTeX Guide

- https://tobi.oetiker.ch/lshort/lshort.pdf

  This online article is a semi-lengthy but thorough introduction to LaTeX. Great for people who are just starting.

- https://www2.mps.mpg.de/homes/daly/GTL/gtl_20030512.pdf

  Another extensive guide that does a good job teaching the basics as well as go a little more in depth.

- http://www.rpi.edu/dept/arc/docs/latex/latex-intro.pdf

  Another extensive guide that does a good job teaching the basics as well as going a little more in depth in some areas.

14.3 Boxes

While this source is long, it provides great insight that leads to a greater understanding of the entire LaTeX system. So if you are eager to dig deep into the latex language, the following source is a great place to start.

- tcolorbox.pdf

  This source is contained in the folder along with this file. This source is the longest source out of all the sources but is packed with information about all the great things you can do with boxes, such as the ones seen in this guide.

14.4 Typesetting Math Documents

14.4.1 Creating Math Documents

- http://www-math.mit.edu/~psh/exam/examdoc.pdf

  Extensive guide on how to write exams.

- mathexam.pdf

  You will find this source in the mathexam folder after having downloaded the mathexam.zip file onto your computer. This is a great source if you want to learn an alternate way to creating math test/exam using latex.

14.4.2 Symbols

- https://www.caam.rice.edu/~heinken/latex/symbols.pdf

  List of Mathematical Symbols.

- https://www.bu.edu/math/files/2013/08/LongTeX1.pdf

  An additional list of Symbols.

14.4.3 Typing Math Functions/Equations

- https://www.overleaf.com/learn/latex/Integrals,_sums_and_limits

  Goes over typesetting Integrals, Summations, and Limits.

- https://www.overleaf.com/learn/latex/Subscripts_and_superscripts

  Goes over typesetting subscripts and superscripts

- https://www.overleaf.com/learn/latex/Fractions_and_Binomials

  Goes over typesetting fractions and binomials.

14.5 Graphics

14.5.1 Images

- graphicx.pdf

  This source provides a great introduction for people interested in exploring the intricacies behind inserting images into a document.

- https://www.overleaf.com/learn/latex/Inserting_Images

  Goes over some of the specifics behind setting up the `\graphicspath` and inserts Images.

14.5.2 Colors

- http://latexcolor.com/

  Provides you with a multiple of RGB color definitions for the user to use in their documents

14

SECTION

References

[1] Diabetes Definition
https://en.wikipedia.org/wiki/Type_1_diabetes

[2] Bolus Definition
https://en.wikipedia.org/wiki/Bolus_(medicine)

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