

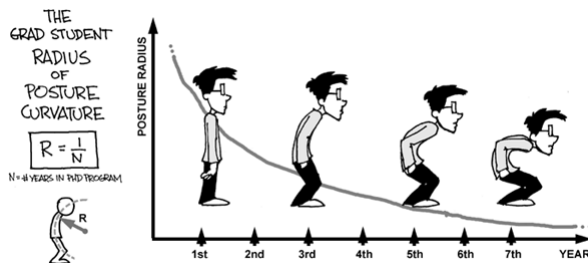
# Introduction to LaTeX

adding images, tables, ...



## Contents

- Images
- Tabular
- Floats
- Captions



# Images

- Ensure that the images are high quality.
- Additional package needed: `graphicx` package provides commands to include images
- Images behave quite similar to characters, just in larger boxes
- [https://en.wikibooks.org/wiki/LaTeX/Importing\\_Graphics](https://en.wikibooks.org/wiki/LaTeX/Importing_Graphics)
- [https://www.overleaf.com/learn/latex/Inserting\\_Images](https://www.overleaf.com/learn/latex/Inserting_Images)



# Images

- Which formats can be handled mainly depends on dvi processor:
  - PS output: eps, (jpeg);
  - PDF output: png, jpeg, pdf, eps (pdflatex)
- **Compiling with *latex***
  - The only format you can include while compiling with *latex* is **EPS**.
- **Compiling with *pdflatex***
  - If you are compiling with pdflatex to get a PDF, you have a wider choice. You can insert
  - **JPG**, widely used on Internet, digital cameras, etc.
  - **PNG**, very common format (even if not as much as JPG)
  - **PDF**, it is widely used for documents but can be used to store images as well.
  - **EPS**



# Images

- Include graphics file (as box):

```
\includegraphics[options]{filename}
```

- where options is a comma separated list of:

- `angle=x` rotate picture by x
- `width=len` scale picture to width len
- `height=len` scale picture to height len
- `scale=x` scale picture
- `draft` don't display image, just draw bounding box with filename inside

- File: *demo\_includegraphics\_01.tex*

- File: *demo\_includegraphics\_02.tex*



# Images

```
% playing around with the options

Changing both height and width is not always
a good idea
\includegraphics[height=3cm,width=5cm]{figures/tux.pdf}

\includegraphics[width=0.5\linewidth]{figures/tux.pdf}

Turning it around
\includegraphics[angle=-30,width=5cm]{figures/tux.pdf}
\includegraphics[angle=-60,width=5cm]{figures/tux.pdf}
\includegraphics[angle=-90,width=5cm]{figures/tux.pdf}

Scaling it
\includegraphics[scale=0.30]{figures/tux.pdf}

Draft, show no picture, only the bounding box
\includegraphics[draft,scale=0.25]{figures/tux.pdf}
```



Turning it around



# Images

- the most obvious thing to set is the `width` or the `height` of an image.
- Tip: use dimensions relative to the `\textwidth` or `\linewidth` and `\textheight`.
- `\textwidth` is the width of the text block on the physical page
- `\linewidth` is the current width, which might locally be different (ex. documentclass option `twocolumn`).

## Location of images

- Tell LaTeX where to look for images
- Images can be stored centrally for use in many different documents.
- `\graphicspath` : provide an additional directory path to search for images (relative path)

```
\graphicspath{{/var/lib/images/}} \graphicspath{{./images/}}
\graphicspath{{images_folder/}{other_folder/}{third_folder/}}
```
- Or specify absolute path

```
\includegraphics{D:/Cursus_Final/Latex/examples/Basics-
3/figures/atomium.jpg}
```
- File: *demo\_includegraphics\_03.tex*

## Hands-on

- Use the file `demo_includegraphics_01` and change the options, check the result.
- Use google images, to search for some pictures to enclose.



## Guidelines for Making Tables

- Get a good layout
  - Avoid vertical lines
  - Avoid “boxing up” cells, usually 3 horizontal lines are enough: above, below, and after heading
  - Avoid double horizontal lines
  - Enough space between rows
  - If in doubt, align left

Taken from: Markus Püschel <https://www.inf.ethz.ch/personal/markusp/teaching/guides/guide-tables.pdf>



# Tables

- LaTeX has fairly rudimentary native support for tables.
- `environment`, designed for formatting data into nicely arranged tables.
  - `tabular` in text modus
  - `array` in mathematical mode
- A tabular environment creates a table that LaTeX treats as a “large symbol”. A table cannot be broken across pages.
- LaTeX determines the width of the columns automatically.
- <https://en.wikibooks.org/wiki/LaTeX/Tables>
- <https://www.latex-tutorial.com/tutorials/tables/>
- <http://nepsweb.co.uk/docs/tableNotes.pdf>



## Tabular

```
\begin{tabular}[pos]{cols}
column 1 entry & column 2 entry ... & column n entry \\
... ..
\end{tabular}
```

File: *demo\_tabular\_basic.tex*

```
\begin{tabular}{l|r}
Track (100 m): & 25 sec \\
Swim (50 m): & 10 min \\
Bike (1 km): & 5 min \\
\end{tabular}
```

Track (100 m):	25 sec
Swim (50 m):	10 min
Bike (1 km):	5 min



# Tabular

- Arguments to describe the table columns:

- & column separator
- \\ start new row
- \hline horizontal line

l	left-justified column
c	centered column
r	right-justified column
p{'width'}	paragraph column with text vertically aligned at the top
m{'width'}	paragraph column with text vertically aligned in the middle (requires array package)
b{'width'}	paragraph column with text vertically aligned at the bottom (requires array package)
	vertical line
	double vertical line

## Row format

- A row of a tabular is separated into columns by & (alignment character)
- A row end is indicated by \\
- Rows may contain less, but not more columns than specified by tabular argument
- Width of a column is determined by the width of the largest cell

# Hands-on

- Write a file, building these simple tables. (*handson\_tabular\_01.tex*)

A very basic table:

1	2	3
4	5	6
7	8	9

Expanding upon that by including some vertical lines:

1	2	3
4	5	6
7	8	9

To add horizontal lines to the very top and bottom edges of the table:

1	2	3
4	5	6
7	8	9

And finally, to add lines between all rows, as well as centering:

1	2	3
4	5	6
7	8	9



## Table wizard (TeXstudio)

- Get some help from your editor

Quick Tabular

1 | c | c |

2 | | |

Num of Columns: 2

Columns

Column: 1

Alignment: Center

Left Border: 1

Apply to all columns

Right Border (last column): 1

Num of Rows: 2

Rows

Row: 1

☒ Top Border

☐ Merge columns: 1 -> 2

Apply to all rows

☒ Bottom Border (last row)

☐ Add vertical margin for each row

OK Cancel



## Combining rows and columns

- Columns can be combined in a bigger cell:  
`\multicolumn{cols}{pos}{text}`
  - Combines the next cols to single column with alignment pos and contents text
  - Must be at the beginning of a row or directly after &
- To combine rows: package multirow
- *File: demo\_tabular\_multi.tex*



## Horizontal, vertical lines

- Vertical lines are marked by | in column specification
- Horizontal lines are inserted with `\hline`
- A horizontal line from column x to y:  
`\cline{x-y}`
- A vertical line, over the height of a cell  
`\vline`
- *File: demo\_tabular\_more.tex*



# Limiting width

- `p{width}`
- defines a paragraph column with the specified *width*
- More power with packages:
- Package `tabularx`
- `\begin{tabularx}{width}[position]{column form}`  
*Table data*  
`\end{tabularx}`
- Package `array`: `m`-parameter
- *File: demo\_tabular\_limit.tex*

```
\begin{tabular}{|l c  
p{90mm} |}  
\hline  
Column 1 & Column 2 &  
Column 3\\  
\hline\hline  
Lorem Ipsum & 1 & Lorem  
ipsum dolor sit amet,  
consectetuer adipiscing  
elit. Vivamus dictum  
tortor pellentesque dui.  
Vivamus dui. Mauris  
feugiat vehicula turpis.  
Etiam convallis metus ut  
odio adipiscing  
malesuada. Quisque et  
ante. Aliquam molestie.
```

Column 1	Column 2
Lorem Ipsum	1
Lorem Ipsum	2

Column 1	Column 2	Column 3
Lorem Ipsum	1	Lorem ipsum dolor sit amet, consectetur adipiscing elit. Vivamus dictum tortor pellentesque dui. Vivamus dui. Mauris feugiat vehicula turpis. Etiam convallis metus ut odio adipiscing malesuada. Quisque et ante. Aliquam molestie. Nulla facilisi. Pellentesque quis purus. Mauris a augue. Donec elit ligula, feugiat quis, dignissim vitae, nonummy ac, elit. Nunc eu augue. Morbi laoreet, velit id lobortis congue, eros libero tincidunt nisi, nec interdum nibh dui et nulla. Aliquam faucibus, nisl quis bibendum iaculis, tellus augue tempus nulla, quis gravida leo orci eu quam. Suspendisse felis. Ut id nunc.
	2	Phasellus blandit est. Maecenas odio neque, euismod in, hendrerit ut, ultrices sed, odio. Vivamus iaculis lectus non arcu. Suspendisse laoreet, felis sed malesuada fermentum, libero sem feugiat quam, et porta libero justo id dolor. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Vivamus posuere. Duis

## Long tables

- If the table is longer than one page, then package `longtable` should be used.
- tables that can be broken by the standard LaTeX page-breaking algorithm. There are four elements parameters to set
- *File: `demo_tabular_longtable.tex`*
- To create a table in landscape mode, the `rotating` package is needed.
- The table is produced using a *new* environment `sidewaystable`

```
\begin{sidewaystable}
...
\end{sidewaystable}
```
- *File: `demo_table_rotating.tex`*



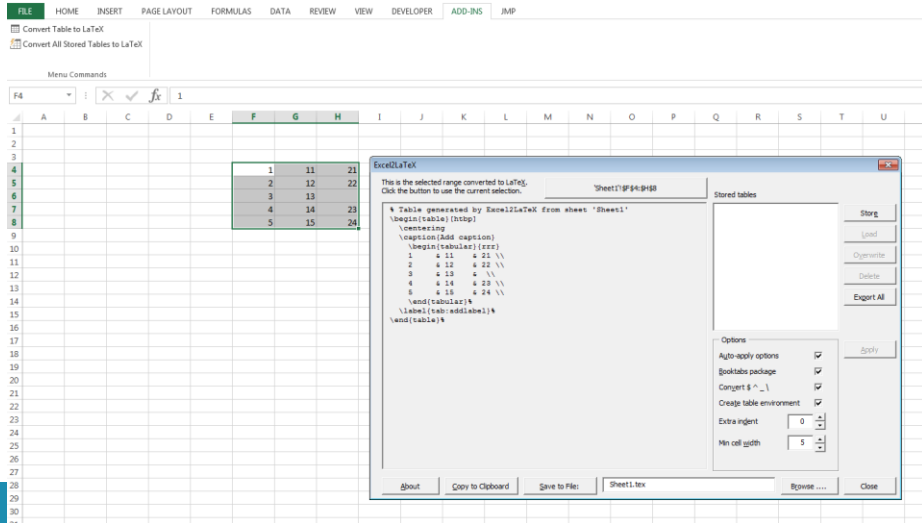
## Tables from excel

- LaTeX code to generate tables can be cryptic at first.
  - use software to write this code
  - create tables in Excel and export them to LaTeX.
- Excel tables can be converted using:
  - `excel2latex` (<https://www.ctan.org/tex-archive/support/excel2latex/>)  
tested: works with Office 2013
  - `LaTable` ([www.ctan.org/tex-archive/help/Catalogue/entries/latable.html](http://www.ctan.org/tex-archive/help/Catalogue/entries/latable.html))
    - ? recent
- Note:
  - Some features will not be supported
  - Extra editing can be needed
  - It will help to understand how the "table" commands work.



# excel2latex

- Office 2013



## Webtool

- <http://www.tablesgenerator.com/>
- Create the table in your browser, copy the code into your LaTeX document
- <http://ericwood.org/excel2latex/>

# Floats

- LaTeX breaks paragraphs and sentences across pages to avoid partially filled pages.
- Problem: table or image is too large to be placed on the page
  - Pictures and tables, cannot be split;
  - *float*ed to convenient places, such as the top of the following page
  - Get a minimum amount of whitespace
- Floats: Objects, depending on the space available, will be placed where they are invoked or further on in the text.
- [http://en.wikibooks.org/wiki/LaTeX/Floats,\\_Figures\\_and\\_Captions](http://en.wikibooks.org/wiki/LaTeX/Floats,_Figures_and_Captions)



# Floats

- Works for images and tables: `table` and `figure` are two of the environments provided by LaTeX
- Common way of including images, tables:
  - Use the correct environment (`table` or `figure`).
  - Center the content, if desired.
  - Include the image.
  - Add a caption.
  - Add a label for cross-referencing.
- floats may become a major source of frustration, when LaTeX does not put them where you want them to be.
- *File: demo\_float\_01.tex*



# Floats

- Any material enclosed in a figure or table environment will be treated as floating matter.
- `\begin{figure}[placement specifier]` or `\begin{table}[. . .]`
- *placement specifier*. parameter used to indicate the locations to which the float is allowed to be moved.
  - **h (Here)**: at the very place in the text where it occurred. This is useful mainly for small floats.
  - **t (Top)**: at the *top* of a page.
  - **b (Bottom)**: at the *bottom* of a page
  - **p (Page of floats)**: on a special *page* containing only floats.
  - **! Force!** (does not work with p)



# Rules

- Floating objects will not appear prior to the page where they are referred on
- If floating objects can not be placed, they will appear at the end of the document.
- `\clearpage` can force the pending objects to be placed
- `package placeins`. This provides the command `\FloatBarrier` which causes all unprocessed floats to be processed at that point, but does not start a new page unless it is necessary.  
To keep floats in the sections in which they were included, use:  
`\usepackage[section]{placeins}`



## caption

- It is always good practice to add a caption to any figure or table.

`\caption[shortform]{text}`

- Place caption on top or at the bottom
- Needs to be in a table or figure environment
- Automatic numbering:
  - Table nr:
  - Figure nr:
- The shortform will be used in the list of figures, list of tables.
- *File: demo\_caption\_01*



## Hands-on

- Use *demo\_float\_01* and change the placement specifier, check the resulting output
- Use *demo\_float\_02*
  - Compile the text and check the list of tables and the list of figures.
  - Change the placement specifier, check the resulting output



## More with tables

- Put color in tables
  - Package `colortbl` with additions of `xcolor` (when used, load this package as last).  
<http://tex.stackexchange.com/questions/5363/how-to-create-alternating-rows-in-a-table>
  - *File: `demo_colortable.tex`*
- Package `wrapfig`
  - Allows text to be wrapped around a table
  - *File: `demo_wraptable.tex`*