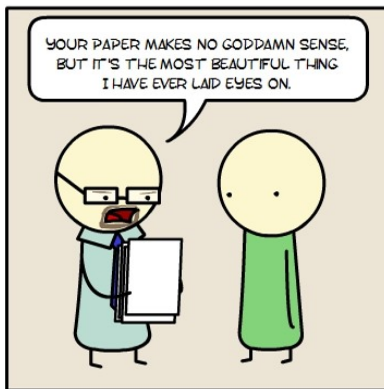


# L<sup>A</sup>T<sub>E</sub>X

Coding club 05-04-2018



# Overview of this coding club

- 1 What is L<sup>A</sup>T<sub>E</sub>X?
- 2 TeX editors
- 3 Create your first doc
- 4 Typesetting
- 5 Maths
- 6 Tables & Figures
- 7 References
- 8 Last words

# What is L<sup>A</sup>T<sub>E</sub>X?

- Document preparation system
- OpenSource, free, coded/typed, platform independent, beautiful
- Focus on content & professional typesetting (trade-off in MS Word)
- Not *wysiwyg* but *wysiwym*

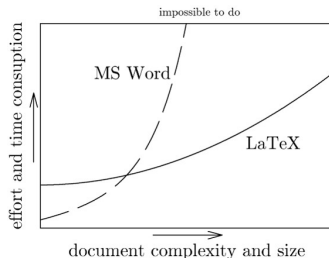


Figure 1: e.g. automated numbering, sections, figures, intradoc ref...

# Word vs. L<sup>A</sup>T<sub>E</sub>X

$$K(d_s) = \frac{1}{\lambda} \sum_{i=1}^N \sum_{j=1}^N \frac{\delta_{ij}(|x_i - x_j| \leq d_s)}{N}$$

$$K(d_s) = \frac{1}{\lambda} \sum_{i=1}^N \sum_{j=1}^N \frac{\delta_{ij}(|x_i - x_j| \leq d_s)}{N}$$

# What is L<sup>A</sup>T<sub>E</sub>X?

- Markdown
  - Lightweight markup language with plain text formatting syntax, easily converted to HTML
  - Readability, less implementations to customize
  - *Report with code vs writing your PhD dissertation*
- Other benefits for academics
  - Many journals/publishers except latex formats, provide own template (PNAS, BES journals, Elsevier, Springer)
  - Mathematical formulas
- Disadvantage: collaborative editing

# TeX editors

Allow you to compile your TeX-file and build pdf

Help you with inserting symbols/equations, auto-completion and setting up your document

- [TeXworks](#) (MikTeX)
- [TeXnicCenter](#)
- [TeXstudio](#)



detailed comparison of editors:

<https://beebom.com/best-latex-editors/>

# Before jumping into the cold water...

- A **command** begins with `\`: `\begin{figure}`, `\section{}`...
- The object of your command (variable/input) comes directly after the command-name enclosed by **curly brackets** `{}`. Sometimes extra 'set-ups' are done with square brackets `[]`
- **Float**: a container for things that cannot be broken apart: figure with caption, table.
- `\usepackage{}` is like `library()` in R
- comments are added with `%`

## Exercise 1.0

Open TeXworks or TeXstudio & type

```
\documentclass[a4paper, 12pt]{article}
\begin{document}
  My first \LaTeX{} document! Yeay!
\end{document}
```

Compile, Build & View



## Exercise 1.1a

Add a title page

```
\title{My First Document}  
\author{Your name}  
\date{\today} %or specify  
\maketitle
```

## Excercise 1.1b

Change type of the DOCUMENTCLASS now to REPORT, what is the difference?

```
\clearpage
```

More info on document structure in L<sup>A</sup>T<sub>E</sub>X:

[https://en.wikibooks.org/wiki/LaTeX/Document\\_Structure](https://en.wikibooks.org/wiki/LaTeX/Document_Structure)

## Exercise 1.2

Add sections to your document

```
\section{Introduction}
```

This will be the intro

```
\subsection{First part of introduction}
```

```
\subsubsection{...}
```

```
\paragraph{...}
```

```
\subparagraph{...}
```

What is the difference between PARAGRAPH and SECTION? Try  
CHAPTER (documentclass report and book)

## Exercise 1.3

Make a template for today's exercises with sections Typesetting, Maths, Tables & Figures, References. In these sections you can make subsections Exercise 1 etc.

## Exercise 1.4

Add table of contents after the titlepage

```
\tableofcontents
```

compare how this would work out in a large document in word...

# Typesetting in L<sup>A</sup>T<sub>E</sub>X

## Start a new line

`\\` (cfr double space in Markdown)

`\noindent`

`\indent`

## Fonts

`\textit{italics}`

*italics*

`\textsc{smallcaps}`

SMALLCAPS

`\textbf{bold}`

**bold**

`\underline{underlined}`

underlined

<https://en.wikibooks.org/wiki/LaTeX/Fonts>

# Typesetting in L<sup>A</sup>T<sub>E</sub>X

## Fontsize

<code>{\tiny tiny words}</code>	tiny words
<code>{\footnotesize footnotesize words}</code>	footnotesize words
<code>{\small small words}</code>	small words
<code>{\large large words}</code>	large words
<code>{\LARGE LARGE words}</code>	LARGE words
<code>{\huge huge words}</code>	huge words

## Colors

```
\usepackage{xcolor} %(cfr library() in R)
{\color{colour_name} text}
```

red, green, blue, cyan, magenta, yellow

<https://en.wikibooks.org/wiki/LaTeX/Colors>

# Typesetting in L<sup>A</sup>T<sub>E</sub>X

## Exercise 2

Try to imitate this paragraph in your introduction

This is my **introduction**, I want to tell you something really,  
really, really, **really** incredible.

My article is AMAZING.

It's **great**, just great.

*Believe me*, we're going to make the **TEREC****EON****LIMNO** great  
again!

# Symbols

## Symbols in your text

Most symbols are added in your text with their name in between  $\$$

$\$ \backslash \text{tilde}\{n\} \$$ ,  $\$ \backslash \text{pm} \$$ ,  $\$ \backslash \text{alpha} \$$ ,  $\$ \backslash \text{backslash} \$$

$\$ < \$$  or  $\$ \backslash \text{textless} \$$ ,  $\$ > \$$  or  $\$ \backslash \text{textgreater} \$$ ,  $\$ \backslash \text{infty} \$$

$\tilde{n}$ ,  $\pm$ ,  $\alpha$ ,  $\backslash$ ,  $<$ ,  $>$ ,  $\infty$

Some can be used with command-symbol

$\backslash \#$   $\backslash \$$   $\backslash \%$   $\backslash ^$   $\{ \}$   $\backslash \&$   $\backslash _$   $\backslash {$   $\backslash }$   $\backslash \sim$   $\{ \}$

Your L<sup>A</sup>T<sub>E</sub>X editor is helpful here!

[https://oeis.org/wiki/List\\_of\\_LaTeX\\_mathematical\\_symbols](https://oeis.org/wiki/List_of_LaTeX_mathematical_symbols)

# Lists

Default has 4 levels (more can be added with use of packages)

```
\begin{enumerate}  
\item My 1st point  
\item My 2nd point  
\end{enumerate}
```

1. My 1st point
2. My 2nd point

```
\begin{itemize}  
\item My 1st point  
\item My 2nd point  
\end{itemize}
```

- My 1st point
- My 2nd point

More tips & tricks on how to easily **change your enumeration signs** or make **nested lists** etc:

<https://www.latex-tutorial.com/tutorials/lists/>



## Exercise 3

Try to make the following nested enumeration

1. Department Biology
  - Terec
    - Dries Bonte
    - Luc Lens
  - Eon
    - \* Matthew Shawkey
  - Linno
    - \* Dirk Verschuren
2. Department Forest and Water Management
  - ForNaLab
    - Kris Verheyen
    - Lander Baeten
    - Pieter De Frenne
    - Jan Mertens

# Equations

## Three ways

- In your text:  $a + b = 5$   
...a set of equations, such as  $a + b = 5$  and  $a = \frac{b}{2}$  are easily solved...
- displayed equation:  $\int \frac{\sin(x)}{x}$

$$\int \frac{\sin(x)}{x}$$

- numbered equation:  $\begin{equation} \dots \end{equation}$

$$\int \frac{\sin(x)}{x} \tag{1}$$

Let your editor help you get to learn the code!

# Use of numbered equations

With these numbered equations (and figures and tables, see later), you can easily cross reference inside your document.

- 1 Give your equation/figure/table a **label**{ } with `\label` (e.g. `eq:Euler`, `tab:fruits`, `fig:map`, `sec:typesetting`). Label inside your 'float'.
- 2 When you want to **refer to it in your text** (see Figure X) or in formula (1), you just say ...see formula `\ref{int-sinx}`

Advantage over Word?

## Exercise 4

Create following equation and refer to it in a sentence introducing the equation

...equation 2 was used to calculate this metric.

$$K = \sum_{i=0}^{i=n} \frac{\sqrt{\alpha}}{\delta_{ij}} \quad (2)$$

# Floats

Tables & figures are floats, which means that latex will choose the best possible presentation for them (you don't have to worry about them how they will jump while you complete your text).

But you don't always agree with L<sup>A</sup>T<sub>E</sub>X, that's why **placement specifiers** exist.

`h, t, b, p, !, H` (package `float`)

here, top, bottom, separate page, force it a bit please, HERE

# Tables

```
\begin{table}[ht]
\caption{Fruits and their properties}
\begin{tabular}{|l||c|r}
Fruit & Colour & Shape\
\hline
Apples & Green & Nearly round\
Strawberries & Red & Triangle\
\end{tabular}
\end{table}
```

Table 1: Fruits and their properties

Fruit	Colour	Shape
Apples	Green	Nearly round
Strawberries	Red	Triangle

## Exercise 5

Try to imitate this table

City	Year		
	2006	2007	2008
London	45.000	46.000	51.000
Berlin	35.000	33.000	30.000
Paris	50.000	51.000	52.000

More useful stuff on tables:

<https://nl.wikibooks.org/wiki/LaTeX/Tabellen>

# Figures

Put figures in the same map as or in a subdirectory of your .tex-file

```
\usepackage{graphicx}
\begin{figure}
\centering
\caption{Cartoon about \LaTeX{}}
\includegraphics[width=0.25\textheight]{cartoon.jpg}
\end{figure}
\end{frame}
```

Figure 2: Cartoon about L<sup>A</sup>T<sub>E</sub>X





## Exercise 6

Download [this figure](#) and include it in your document. Make sure you can refer to it in your text.



Figure 3: What an amazing digger wasp!

More tips & tricks about figures on [wikibooks](#)

- wrapping a figure in your text
- side captions
- adding subfigures
- ...

# Bibliography and references

References are stored in an auxiliary file/database: a BibTeX-file (\*.bib)

You can export a bib-file from Mendeley (or Endnote). Put this file in the same directory as your tex-file.

# Citing

‘Cite key’, standard L<sup>A</sup>T<sub>E</sub>X is numbered

```
\cite{Mane12003}
```

Other styles with `\usepackage[round]{natbib}`

<code>\citet{goossens93}</code>	Goossens et al. (1993)
<code>\citep{goossens93}</code>	(Goossens et al., 1993)
<code>\citet*{goossens93}</code>	Goossens, Mittlebach, and Samarin (1993)
<code>\citep*{goossens93}</code>	(Goossens, Mittlebach, and Samarin, 1993)
<code>\citeauthor{goossens93}</code>	Goossens et al.

# Insert bibliography

```
\bibliographystyle{plain} % set style  
\bibliography{MendeleyLib} % build the bibliography
```

## Exercise 7

Export your bibliography from Mendeley. If you don't have this, there is an example bib-file in the repo.

Use two citations in a sentence. e.g 'Tengö *et al.* say that a digger wasp needs  $\pm 12$  days to finish a nest cycle, provisioning its single larva with flies (Nielsen, 1945).'

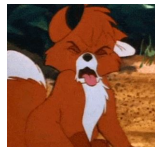
Insert your bibliography in a separate section at the end of your document.

# Biological bibliography styles

Standard bibliography styles are always mathematics/physics like  
(year at the back, beginning with first name...).

[apalike comes closest.](#)

- [1] Michel Goossens, Frank Mittelbach, and Alexander Samarin. *The L<sup>A</sup>T<sub>E</sub>X Companion*. Addison-Wesley, Reading, Massachusetts, 1993.
- [2] Albert Einstein. Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]. *Annalen der Physik*, 322(10):891–921, 1905.



That's disgusting!

# Biological bibliography styles

Biological styles can be downloaded from [this \(ugly\) site](#).  
Put the .bst file of your preferred style (e.g. ecol\_let.bst or pnas.bst) in the same directory as your .tex-script.

```
\usepackage[round]{natbib}
```

```
\bibliographystyle{ecol_let}
```

```
\bibliography{ExampleExport}
```

## Exercise 8

Make your bibliography look like one of the biological journals listed on the site.

## Further help

- Google is your friend!

How to:

- make margins bigger in L<sup>A</sup>T<sub>E</sub>X
- make two columns in article style in L<sup>A</sup>T<sub>E</sub>X
- add an enter after paragraph title L<sup>A</sup>T<sub>E</sub>X
- ...∞
- There are often multiple solutions possible (twocolumn, \twocolumn, \usepackage{multicol},...)
- Find templates on the internet, so you don't have to start from scratch: <https://www.latextemplates.com/>
- L<sup>A</sup>T<sub>E</sub>X @ UGent (Dutch):  
<https://latex.ugent.be/wat-latex>



# Recommendations from me personally

- It's up to you how and when you want to use L<sup>A</sup>T<sub>E</sub>X
- Manuscripts: collaborative MS Word, default @Terec (time for change?). Github to the rescue?
- PhD thesis: L<sup>A</sup>T<sub>E</sub>X for sure!