

# Introduction to writing with LaTeX

Markus Stocker

May 12, 2017

# Outline

- Morning lecture
  - ▶ What is  $\text{\LaTeX}$
  - ▶ Motivating  $\text{\LaTeX}$
  - ▶  $\text{\LaTeX}$  software environment
  - ▶ Basics of writing  $\text{\LaTeX}$  documents
  - ▶ Scientific documents with journal  $\text{\LaTeX}$  templates
  - ▶  $\text{\LaTeX}$  for slides and posters
  - ▶ Collaborative writing and versioning of  $\text{\LaTeX}$  documents
- Afternoon hands-on
  - ▶ Develop your  $\text{\LaTeX}$  manuscript
  - ▶ Style your manuscript with journal templates
  - ▶ Revise your manuscript with track changes
  - ▶ Create slides and a poster to present your work
  - ▶ Collaborative writing with your co-authors

# Schedule

10.00 - 11.30	Lecture
11.30 - 12.30	<i>Lunch</i>
12.30 - 13.15	Hands-on I
13.15 - 13.30	<i>Break</i>
13.30 - 14.15	Hands-on II
14.15 - 14.45	<i>Coffee break</i>
14.45 - 15.30	Hands-on III
15.30 - 15.45	<i>Break</i>
15.45 - 16.30	Hands-on IV
16.30 - 17.00	Closing

# About me

- Postdoc with PANGAEA at MARUM
- PhD in environmental informatics at University of Eastern Finland
- MSc in informatics at University of Zurich
- MSc in environmental science at University of Eastern Finland (*soon*)
- My history with L<sup>A</sup>T<sub>E</sub>X goes back to 2001 when ...

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

- Document preparation system
- Authored by Leslie Lamport, first released in 1985
- Most often used for technical or scientific documents
- Separate presentation from content
- Worry less about style and more about content
- Write plain text rather than formatted text
- Leave document design to designers
- Free software
- Available for Windows, Mac OS, Linux, Online

<https://www.latex-project.org>

# What is $\text{\LaTeX}$

- **Markup tagging** is central to writing with  $\text{\LaTeX}$
- Label parts of the document using tags, e.g. `\textit{}`
- It is used to do things like
  - ▶ Define document structure, e.g. chapters, sections
  - ▶ Style text, e.g. italic, symbols, tables
  - ▶ Cite, footnote, cross-reference, ...
- Anyone familiar with HTML?

# Markup tagging

```
\textit{Example}  
markup  
\underline{tagging}
```

*Example* markup tagging

# Markup tagging

```
\begin{itemize}  
\item Eggs  
\item Milk  
\item Cheese  
\item Carrots  
\end{itemize}
```

- Eggs
- Milk
- Cheese
- Carrots



# Markup tagging

`$ E = mc^2 $`

$$E = mc^2$$

# Why L<sup>A</sup>T<sub>E</sub>X: Advantages

- High typographic quality
- Excels at difficult typesetting tasks, e.g. mathematical text
- Makes things easy, e.g. citation, cross-reference, table of content
- Great engineering, fast and stable
- Even with long and complex documents
- No corrupt files, content loss, etc.
- Truly portable across systems

# Why *not* L<sup>A</sup>T<sub>E</sub>X: Disadvantages

- Learning curve, somewhat difficult to learn
- Though, basics are *really* easy
- Surely requires some time
- Not WYSIWYG
- More difficult in collaborative writing
- Less support for tracking changes

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

- You need a distribution
  - ▶ Most likely TeX Live (<http://www.tug.org/texlive/>)
  - ▶ Or MiKTeX on Windows (<https://miktex.org/>)
  - ▶ Possibly MacTeX (<http://www.tug.org/mactex/>)
- Some kind of editor
- If you like Notepad, Vim, Emacs, ...
- Preferably,
  - ▶ TeXstudio (<http://texstudio.org/>)
  - ▶ Texmaker (<http://www.xmlmath.net/texmaker/>)
  - ▶ TeXnicCenter on Windows (<http://www.texniccenter.org/>)
  - ▶ TeXShop on Mac OS (<http://pages.uoregon.edu/koch/texshop/>)
  - ▶ Among others ...
- Make use of packages, of which there are several thousands

# Working with $\text{\LaTeX}$

- 1 Install distribution and editor
- 2 Install required packages
- 3 Write  $\text{\LaTeX}$  document using editor
- 4 Translate  $\text{\LaTeX}$  document into PDF document
- 5 Iterate over points (2) and 3-4 until done

The screenshot shows the TeXstudio application window. The title bar indicates the file path: C:\Users\Markus\Desktop\example.tex - TeXstudio. The menu bar includes File, Edit, Idefix, Tools, LaTeX, Math, Wizards, Bibliography, Macros, View, Options, and Help. The toolbar contains icons for opening files, saving, undo, redo, and other editing functions. The main editor area displays the LaTeX source code for 'example.tex'. The code includes document class settings, package loading, and a title. It also contains a paragraph of text about LaTeX and a mathematical alignment example. The status bar at the bottom shows 'Line: 4 Column: 0 INSERT' and encoding information 'UTF-8 Ready Automatic'.

```

example.tex X
\documentclass[12pt]{article}
\usepackage{amsmath}
\title{\LaTeX}

\begin{document}
\maketitle
\LaTeX{} is a document preparation system for
the \TeX{} typesetting program. It offers
programmable desktop publishing features and
extensive facilities for automating most
aspects of typesetting and desktop publishing,
including numbering and cross-referencing,
tables and figures, page layout,
bibliographies, and much more. \LaTeX{} was
originally written in 1984 by Leslie Lamport
and has become the dominant method for using
\TeX; few people write in plain \TeX{} anymore.
The current version is \LaTeXe.

% This is a comment, not shown in final output.
% The following shows typesetting power of LaTeX:
\begin{align}
E_0 &= mc^2 \\
E &= \frac{mc^2}{\sqrt{1-\frac{v^2}{c^2}}}
\end{align}
\end{document}

```

Line: 4 Column: 0 INSERT

UTF-8 Ready Automatic

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

- Start with minimal document
- Develop it gradually by introducing new elements
- Structural elements, e.g. title, sections
- Style text, e.g. font size, italic, bold
- Mathematical and chemical formulae, quantities and units
- Tables, graphics and figures
- Cross-references, footnotes, and index
- Citation and reference list
- Table of contents, list of figures and tables
- Track changes

# Minimal document

```
\documentclass{article}
```

```
\begin{document}
```

```
  Hello World.
```

```
\end{document}
```



Hello World.

# Minimal document

```
\documentclass{article}

% I am a comment
% This area is called the PREAMBLE
% Used to load packages and configure your document

\begin{document}

% This is the BODY of the document
% Document content goes here

\end{document}
```

# Article title

```
\documentclass{article}

\title{Shine On You Crazy Diamond}
\author{Pink Floyd}
\date{1975}

\begin{document}
  \maketitle % Don't worry how it is displayed
              % It will look pretty good
\end{document}
```

# Shine On You Crazy Diamond

Pink Floyd

1975

# Article sections

```
\documentclass{article}

\title{Shine On You Crazy Diamond}
\author{Pink Floyd}
\date{1975}

\begin{document}
  \maketitle

  \section{Introduction}
  \section{History}
  \section{Lyrics}

\end{document}
```

# Shine On You Crazy Diamond

Pink Floyd

1975

- 1 Introduction**
- 2 History**
- 3 Lyrics**

# Sectioning

```
% For article document class
\section{...}
\subsection{...}
\subsubsection{...}
\paragraph{...}
\subparagraph{...}

% Additionally for book document class
\chapter{...}
```

# Text styling

Remember `\textbf{when}` you `\textit{were}` young  
`\underline{you}` shone `\texttt{like}` the  
sun.

```
{\color{red}Now there's}      {\Huge{a}}  
  \textbf{\underline{look in} your}  
  eyes, like      {\tiny{' 'black holes  
{\Large{in the sky}}}' '}}
```

Remember **when** you *were* young you shone like the sun.

**Now there's** **a** **look in** **your** eyes, like "black holes **in the sky**."



# Mathematical formulae

```
\begin{displaymath}  
  \lim_{n \rightarrow \infty}  
  \sum_{k=1}^n \frac{1}{k^2}  
\end{displaymath}
```

Math  $a^2 + b^2 = c^2$  in text style.

$$\lim_{n \rightarrow \infty} \sum_{k=1}^n \frac{1}{k^2}$$

Math  $a^2 + b^2 = c^2$  in text style.

# Chemical formulae

`\ce{CO2}`

`\ce{CO2 + C -> 2 CO}`

This is a `\ce{H2O}` molecule.

I can do charges `\ce{CrO4^2-}` and much more.

$\text{CO}_2$

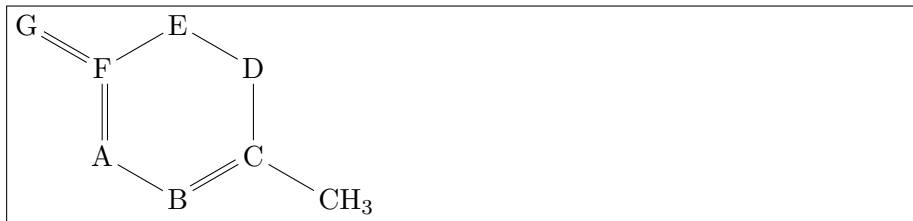
$\text{CO}_2 + \text{C} \longrightarrow 2\text{CO}$

This is a  $\text{H}_2\text{O}$  molecule.

I can do charges  $\text{CrO}_4^{2-}$  and much more.

# Chemical formulae

```
\chemfig{A*6(-B=C(-CH_3)-D-E-F(=G)=)}
```



## Quantities and units

`\num{.3e45}`

`\numlist{10;30;50;70}`

`\numrange{10}{30}`

`\si{\kilo\gram\metre\per\square\second}`

`\SI{1.25}{\metre\per\second}`

$0.3 \times 10^{45}$

10, 30, 50 and 70

10 to 30

$\text{kg m s}^{-2}$

$1.25 \text{ m s}^{-1}$

# Tables

```
\begin{tabular}{|l|c|}  
\hline  
Year & Title \\  
\hline  
1973 & The Dark Side of the Moon \\  
1975 & Wish You Were Here \\  
1979 & The Wall \\  
\hline  
\end{tabular}
```

Year	Title
1973	The Dark Side of the Moon
1975	Wish You Were Here
1979	The Wall

# Graphics

```
\includegraphics[scale=0.8]{thewall.png}
```

The image shows a handwritten logo for Pink Floyd's album 'The Wall'. The words 'PINK FLOYD' are written in a cursive, slanted font at the top. Below them, 'THE WALL' is written in a larger, more stylized cursive font. A single vertical line runs through the center of the text, passing between the 'F' and 'L' in 'FLOYD' and between the 'L' and 'A' in 'WALL', effectively separating the band's name from the album title.

# Figures and captions

```
\begin{figure}  
\centering  
\includegraphics[scale=0.4]{thewall.png}  
\caption{The Wall album cover}  
\end{figure}
```



Figure: The Wall album cover

## Cross-references

```
\begin{equation}\label{eq}  
E = mc^2  
\end{equation}
```

As shown in Equation `\ref{eq}`, ...

$$E = mc^2 \tag{1}$$

As shown in Equation 1, ...

Note: Same approach is used for figures, tables, sections, ...



# Footnotes

Remember when you were young,  
you shone like the sun.

Shine

`on\footnote{Read as if a comma is placed here}`

you crazy

`diamond\footnote{The crazy diamond is Syd Barrett}`.

Now there's a look in your eyes,  
like black holes in the sky.

# Footnotes

Remember when you were young, you shone like the sun.  
Shine on<sup>1</sup> you crazy diamond<sup>2</sup>.  
Now there's a look in your eyes, like black holes in the sky.

---

<sup>1</sup>Read as if a comma is placed here

<sup>2</sup>Syd Barrett is the crazy diamond

# Index

```
\documentclass{article}
```

```
\usepackage{makeidx}
```

```
\makeindex
```

```
\begin{document}
```

```
Shine\index{Sun} on you crazy\newpage  
diamond\index{Diamond}\index{Diamond!Syd}.
```

```
\printindex
```

```
\end{document}
```

## Index

Diamond, 2  
Syd, 2

Sun, 1