Introduction to writing with LaTeX

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Outline

- Morning lecture
  - What is LaTeX
  - Motivating LaTeX
  - LaTeX software environment
  - Basics of writing LaTeX documents
  - Scientific documents with journal LaTeX templates
  - LaTeX for slides and posters
  - Collaborative writing and versioning of LaTeX documents
- Afternoon hands-on
  - Develop your 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	*Lunch*
12.30 - 13.15	Hands-on I
13.15 - 13.30	*Break*
13.30 - 14.15	Hands-on II
14.15 - 14.45	*Coffee break*
14.45 - 15.30	Hands-on III
15.30 - 15.45	*Break*
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 LaTeX goes back to 2001 when ...

What is LaTeX

- 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 LaTeX

- **Markup tagging** is central to writing with 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 LaTeX: 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* LaTeX: 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 LaTeX

- 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.xm1math.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 LaTeX

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

TeXstudio

```
\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}
```

Writing LaTeX 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 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}
```

Minimal 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}
```

Article sections

Shine On You Crazy Diamond

Pink Floyd

1975

1 Introduction

2 History

3 Lyrics

Sectioning

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

% Addtionally 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 <u>you</u> shone `like` the sun.
Now there's a **<u>look in</u> your** eyes, like "black holes in the sky."

Mathematical formulae

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

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

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

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.
```
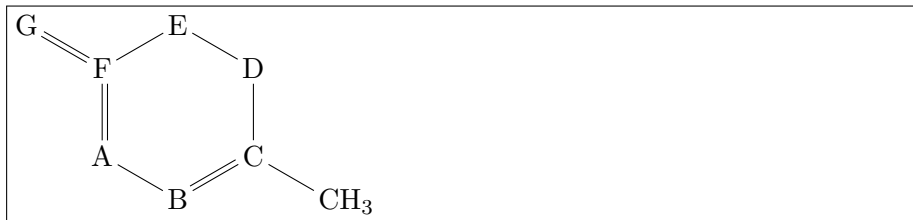

CO_2

$CO_2 + C \longrightarrow 2CO$

This is a H_2O molecule.

I can do charges 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}
```

0.3×10^{45}
10, 30, 50 and 70
10 to 30
$\mathrm{kg\,m\,s^{-2}}$
$1.25\,\mathrm{m\,s^{-1}}$