

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

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# Goal of This Session

- Latex
  - Latex in the web: Overleaf
  - Basic introduction
  - Hands-on Examples
- Reference Management
  - Manage your literature
  - Export your literature for import into Latex

# The Universal Library At Your Fingertips



# Prerequisites

- Overleaf account:

<https://overleaf.com>

- Downloads for the exercises can be found here:

<https://github.com/BioInfPrep/latex/tree/main/ss21>

# Motivation for Using Latex

- Extremely well suited for writing scientific documents
- Significant amount of time is spent on writing scientific texts
- Assignments, reports, theses, publications, etc.
- Production of text documents with a flavour of programming
- Excellent online resources (documentation, forums, etc.)
- And everything for free

# Why Not Use Office Products

- Such as MS Word or LibreOffice Writer
- Getting unhandy (even fails) for larger documents
- Have you ever tried such a thing in Word?

$$\hat{g}_{ij}(r) = \frac{\hat{\rho}_{ij}^s(r)}{\hat{\rho}_{ij}^{bulk}} = \frac{v_j^{bulk}}{v_j^s(r)} \times \frac{\rho_{ij}^s(r)}{\rho_{ij}^{bulk}} = f_j(r) \times \frac{\rho_{ij}^s(r)}{\rho_{ij}^{bulk}}$$

# Why Overleaf

- Times for local Latex installations are over
- Pretty good editor with auto-completion
- Immediate preview (or error messages ;)
- Large number of ready-to-use templates
- Easy sharing of projects for collaborate editing
- Download of projects as zip archives

- Latex Wiki

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

- Overleaf Learning Section

- <https://www.overleaf.com/learn>
  - <https://www.overleaf.com/learn/latex/Tutorials>

- Important Latex Forums

- <http://www.golatex.de>
  - <http://tex.stackexchange.com>

- Learning by doing!!!

(( ( have I already mentioned that G. is your friend )))



# Latex Hands On

- We will assemble a Latex document in Overleaf step by step
- This example shall give you a starting point
- We rebuild the Wikipedia article on Structural Bioinformatics
- The following slides are only a guideline
- Thus: **take notes**

# Hands On: Create a New Project

- Create a new and empty project in Overleaf
- Overleaf already gives you a working project
- Latex documents usually have the extension *tex*
- The central document of a Latex project is *main.tex*
- Everything in Latex is controlled by **commands**
- <https://www.overleaf.com/learn/latex/Commands>

# Hands On: Environments

- **Environments** are used to format blocks of text
- Environments have a *begin* and an *end*
- <https://www.overleaf.com/learn/latex/Environments>

```
\begin{environment}  
  ...  
\end{environment}
```

# Hands On: Title Page

- Really easy to create
- Relevant information specified by commands
- Creation of the title page using a command

```
\title{the_title}  
\author{the_author}  
\date{a_date}  
  
\maketitle
```

# Hands On: Including Text

- Basically, you can type text into your document environment
- We try to structure the project directly using separate files
- You can include .tex files using the **input** command

```
\input{input_filename}
```

# Exercise 1

- 1 Create an empty project for the Wikipedia Article
- 2 Create an appropriate title page
- 3 Download the sections and upload them into your project
- 4 Include the content of the sections into your project

# Hands On: Structuring Content I

- We can easily create sections and subsections
- The corresponding commands are straightforward
- We can also enforce a page break between sections

```
\section{title}  
\subsection{title}
```

```
\section*{title}  
\subsection*{title}
```

```
\newpage
```

# Hands On: Structuring Content II

- We can now use this structure to generate a **table of content**
- Additionally we can enforce extremely useful **navigation**
- For this purpose we include an additional **package**
- And we can explain our raw document using **comments**

```
% A package for document navigation  
% Must be in the preamble  
\usepackage{hyperref}  
% Generate a table of content  
% Placed in the document environment  
% wherever needed  
\tableofcontents
```



# Hands On: Generate Lists

- It is very easy to create lists using environments

```
\begin{itemize} % bullet points
  \item a
  \item b
\end{itemize}
```

```
\begin{enumerate} % enumeration
  \item 1
  \item 2
\end{enumerate}
```

# Hands On: Text Formatting

- Various commands allow you to format text directly
- Commands can be nested (i.e. used inside of each other)

```
\textbf{boldface}
```

```
\emph{italicized}
```

```
\underline{underlined}
```

```
\textcolor{color}{text} % package xcolor
```

## Exercise 2

- 1 Structure your document using sections and subsections
- 2 Create a table of contents
- 3 Try the \*-version of the section-commands, what happens?
- 4 Enable navigation using the hyperref package
- 5 Generate the required lists for your Wikipedia article
- 6 Format all occurrences of "bioinformatics" boldface and blue

# Hands On: Adding an Image

- Images can be added directly
- Or within the figure environment, which brings along advantages
- [https://www.overleaf.com/learn/latex/Inserting\\_Images](https://www.overleaf.com/learn/latex/Inserting_Images)

```
\includegraphics[optional_arguments]{image}
```

```
\begin{figure}[positioning]  
  \centering  
  \includegraphics[optional_arguments]{image}  
  \caption{a_caption}  
  \label{fig:my_label}  
\end{figure}
```

# Hands On: Adding a Table

- Tables are generated within the tabular environment
- <https://www.overleaf.com/learn/latex/tables>
- <https://en.wikibooks.org/wiki/LaTeX/Tables>

```
\begin{table}  
  \begin{tabular}{c | c}  
    col 1 & col 2 \\ % row 1  
    col 1 & col 2. % row 2  
  \end{tabular}  
\end{table}
```

# Hands On: Referencing to Tables and Figures

- Using the **figure** and **tabular** environments allows referencing
- To do so, you just have to specify the **label**
- And use this labels within the **ref** command
- This command just creates numbers

```
\ref{my_figure}  
\ref{my_table}
```

## Exercise 3

- 1 Insert the PDB statistics figure and place it in the PDB section
- 2 Create the contact distance table and place it appropriately
- 3 Create a list of figures and tables
- 4 List and reference to the figure and the table you created

# Hands On: Create Nice Mathematical Formula

- One strength of Latex is formatting and type setting inf maths
- You can do this directly in the text within  $\$ \dots \$$
- Or using the **equation** environment
- You have access to special characters and commands
- Also here, commands can be nested
- [https://www.overleaf.com/learn/latex/mathematical\\_expressions](https://www.overleaf.com/learn/latex/mathematical_expressions)
- <https://en.wikibooks.org/wiki/LaTeX/Mathematics>



## Exercise 4

- 1 Insert the Pythagorean Theorem somewhere in your document
- 2 Insert the lonesome equation of the Wikipedia article
- 3 Make sure it gets a number and is appropriately placed

# Hands On: Include and Cite Literature

- You will always need to properly cite your sources
- I recommend to directly start using a **reference manager**
- My personal favourite is Mendeley:  
`https://www.mendeley.com`
- It allows you to manage your literature
- It allows you to store and annotate corresponding PDFs
- It allows you to export **BibTeX** format (.bib)

# Hands On: Include and Cite Literature

- **BibTeX** format can be integrated in Latex documents
- Latex has a powerful mechanism to generate your References
- Latex offers various bibliography styles (abbrv, alpha, ...)
- [https://www.overleaf.com/learn/latex/Biblatex\\_citation\\_styles](https://www.overleaf.com/learn/latex/Biblatex_citation_styles)

```
\cite{citation_key} % cite literature
```

```
\bibliographystyle{style} % select style
```

```
\bibliography{bibtex_file} % select bibtex file
```

## Exercise 4

- 1 Fetch the BibTex-file from the repository and add it to your project
- 2 Add the bibliography file and a style of your choice
- 3 Cite some of the articles wherever you like
- 4 Go to the PLOS Computational Biology website
- 5 Select an article of your choice and try to get the BibTex citation
- 6 Add and cite this article