MSEA: Introduction to LaTeX using Overleaf

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Slides & Exercises: https://github.com/EPS-Libraries-Berkeley/LaTeX

Outline

1. Introduction: What is LaTeX?
2. Overleaf
3. Structure of a Document
4. Basic Commands
5. Math & Equations
6. Bibliographies
7. Tables & Figures (if time allows)

Introduction

LaTeX is a typesetting system that allows you to focus on your content instead of formatting - formatting is done separately from entry.

You tell LaTeX “what it is” not “how it looks.”

Overleaf for LaTeX

- Create documents via a cloud-based account
- Source code or rich text format
- Collaborating and sharing documents
- Versioning and track changes
- Templates for a variety of documents and publishers
- Link with other tools in your research workflow
- Pro account with your berkeley.edu address

```
\documentclass[flegn,10pt]{wlscirep}
\usepackage[utf8]{inputenc}
\usepackage[T1]{fontenc}

\title{Scientific Reports Title to see here}

\author[1,*]{Alice Author}
\author[2]{Bob Author}
\author[1,2,+]{Christine Author}
\author[2,+]{Derek Author}
\affil[1]{Affiliation, department, city, postcode, country}
\affil[2]{Affiliation, department, city, postcode, country}

\affil[*]{corresponding.author@email.example}

\affil[+]{these authors contributed equally to this work}

%\keywords{Keyword1, Keyword2, Keyword3}

\begin{abstract}
Example Abstract. Abstract must not include subheadings or citations. Example Abstract. Abstract must not include subheadings or citations. Example Abstract.
\end{abstract}
\begin{document}

\flushbottom
\maketitle
% * <john.hammersley@gmail.com> 2015-02-09T12:07:31.197Z:
%
%  Click the title above to edit the author information and abstract
%
\thispagestyle{empty}

\noindent Please note: Abbreviations should be introduced at the first mention in the main text - no abbreviations lists. Suggested structure of main text (not enforced) is provided below.

\section*{Introduction}

The Introduction section, of referenced text \cite{Stark2018BeforePreproducibility} expands on the background of the work (some overlap with the Abstract is
```

Scientific Reports Title to see here

Alice Author[1,*], **Bob Author**[2], **Christine Author**[1,2,+], **and Derek Author**[2,+]

[1]Affiliation, department, city, postcode, country
[2]Affiliation, department, city, postcode, country
[*]corresponding.author@email.example
[+]these authors contributed equally to this work

ABSTRACT

Example Abstract. Abstract must not include subheadings or citations. Example Abstract. Abstract must not include subheadings or citations. Example Abstract.

Please note: Abbreviations should be introduced at the first mention in the main text – no abbreviations lists. Suggested structure of main text (not enforced) is provided below.

Introduction

The Introduction section, of referenced text[1] expands on the background of the work (some overlap with the Abstract is acceptable). The introduction should not include subheadings.[2]

Results

Up to three levels of **subheading** are permitted. Subheadings should not be numbered.

Subsection

Example text under a subsection. Bulleted lists may be used where appropriate, e.g.

- First item
- Second item

Third-level section

Topical subheadings are allowed.

New Section

Discussion

The Discussion should be succinct and must not contain subheadings.

Methods

Topical subheadings are allowed.[3] Authors must ensure that their Methods section includes adequate experimental and characterization data necessary for others in the field to reproduce their work.

References

1. Stark, P. B. Before reproducibility must come preproducibility. *Nature* **557**, 613–613, DOI: 10.1038/d41586-018-05256-0 (2018).
2. Bao, N., Bousso, R., Jordan, S. & Lackey, B. Fast optimization algorithms and the cosmological constant. *Phys. Rev. D* **96**, 103512, DOI: 10.1103/PhysRevD.96.103512 (2017).
3. Fujii, K. *et al.* The role of positron polarization for the inital 250 GeV stage of the International Linear Collider. (2018).

Structure of a Document

Command: a control sequence which performs an action, such as `\newpage`

Preamble: block of commands that define the type of document you are writing, the language you are writing in, the *packages* you would like to use. Comes before `\begin{document}`

```
\documentclass[12pt, letterpaper]{article}
\usepackage{amsmath}
```

Package:
Packages enable you to do more, like create bibliographies, insert images, and write formulas and figures.

Structure of a Document

Environment: A block of code with specific behavior depending on its type. Requires

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

Body: the content of document enclosed inside an environment:

```
\begin{document}
\end{document}
```

Note:

Comments:

Use % to create a comment. Nothing on the line after the % will be typeset.

Restricted Characters:

Certain symbols require a backslash to appear, like $, &, #, and %.

Basic Commands

Bold: \textbf{example}

Italics: \textit{example}

Underline: \underline{example}

Font typefaces: Change in preamble. More information:

https://v2.overleaf.com/learn/Font_typefaces

Make Title

1. The simplest option is to use the `\maketitle` command which draws from the following declarations within the preamble:
    a. \author
    b. \date
    c. \thanks
    d. \title

2. OR use the `\begin{titlepage} ... \end{titlepage}` environment:
    a. The titlepage environment creates a title page, i.e. a page with no printed page number or heading. It also causes the following page to be numbered page one.
    b. Formatting is left to you, but commands like `\centering`, `\vspace`, and `\vfill` are helpful.

Basic Math

To display math inline with text, place formula or symbol in between $:

$x + y = z$

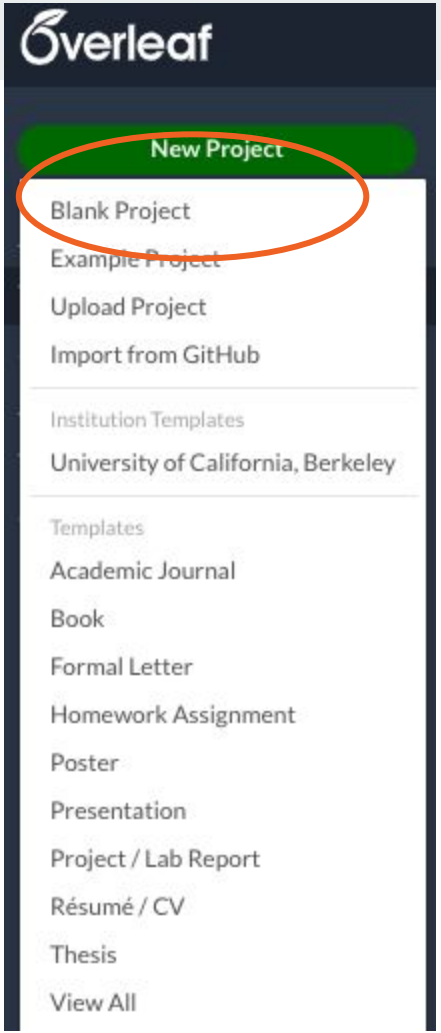
Display mode \[x + y = z \], will center the equation on its own line:

$$x + y = z$$

EXERCISE 1

Objective:

Practice several basic LaTeX commands in a new project.



Mathematics & Equations

Operators and More

Operators & Relations: +, - , = , > , < work as expected

\times = x	\geq = ≥	\neq = ≠
\div = ÷	\leq = ≤	\pm = ±

Fractions: \frac{1}{x} gives $\frac{1}{x}$

Greek Letters

Examples:

\alpha = α	\mu = μ
\beta = β	\pi = π
\Gamma = γ	\rho = ϱ
\delta = δ	\sigma = σ
\Delta = Δ	\psi = ψ
\lambda = λ	\omega = ω
\Lambda = Λ	\Omega = Ω

But A = A (Alpha), B = B (Beta), Z = Z (Zeta), etc.

Limits & Integrals

Limit:

```
\[
\lim_ {x \to \infty} f(x)
\]
```

$$\lim_{x \to \infty} f(x)$$

Integral:

```
\[
\int_{a}^{b} x^2 dx
\]
```

$$\int_{a}^{b} x^2 dx$$

amsmath & amssymb packages

These packages provide you with additional mathematical symbols and commands for structuring equations.

To include, add to your preamble:

```
\usepackage{amsmath}

\usepackage{amssymb}
```

amsmath equation environment

```
\begin{equation}
\frac{\partial Q}{\partial t} = \frac{\partial s}{\partial t}
\end{equation}
```

gives

$$\frac{\partial Q}{\partial t} = \frac{\partial s}{\partial t} \tag{1}$$

Note: use `{equation*}` for unnumbered equations

EXERCISE 2

Objective: Experiment with mathematical notations in LaTeX.

Bibliographies

Bibliographies & Terminology

- .bib = file that stores your references
- **bibtex** and **biber** are external programs that process bibliography information and act as the interface between your .bib file and your LaTeX document.
- **natbib** and **biblatex** are LaTeX packages that format citations and bibliographies.
  - natbib works with bibtex
  - biblatex works with both biber

Natbib is no longer being developed, but is a simple option for quick bibliographies.

We'll focus on **biblatex** today.

What does a .bib entry look like?

```
@article{drachen2016sharing,
 title={Sharing data increases citations},
 author={Drachen, Thea and Ellegaard, Ole and Larsen, Asger and Dorch, S{\o}ren},
 journal={Liber Quarterly},
 volume={26},
 number={2},
 year={2016}
}
```

Key: the syntax used in the cite command to call in an in-text citation

Bibliographies

Step 1

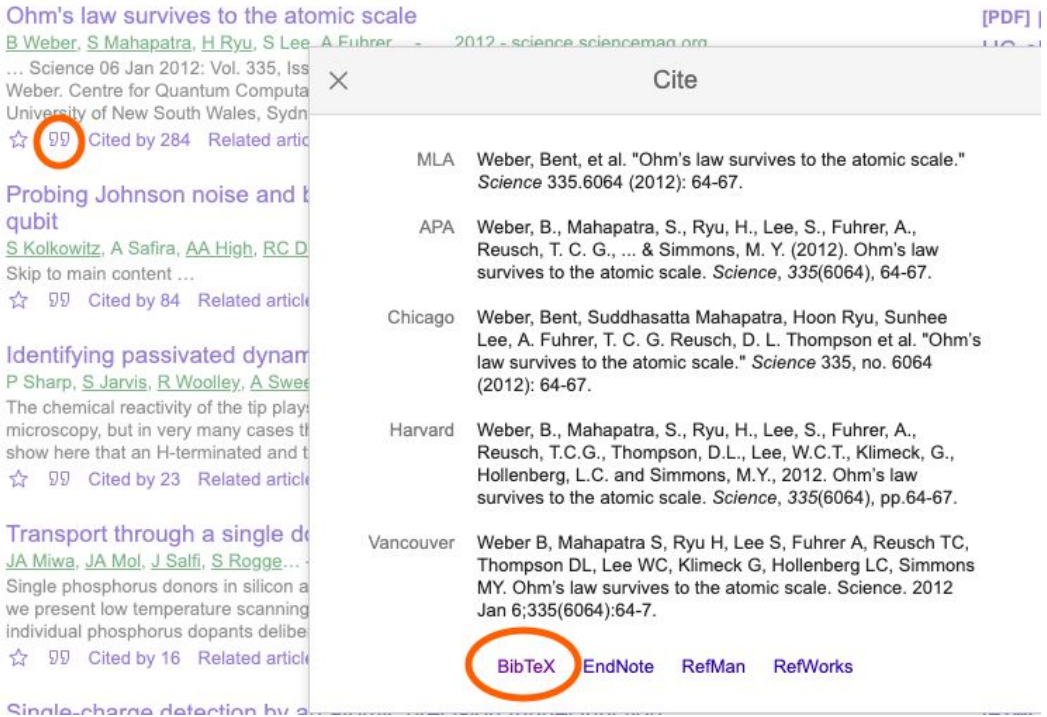
Connect your project to a bibliography in one of three ways:

- Create or upload your own .bib file
- enter a URL
- connect your Mendeley or Zotero account with Overleaf

Bibliographies

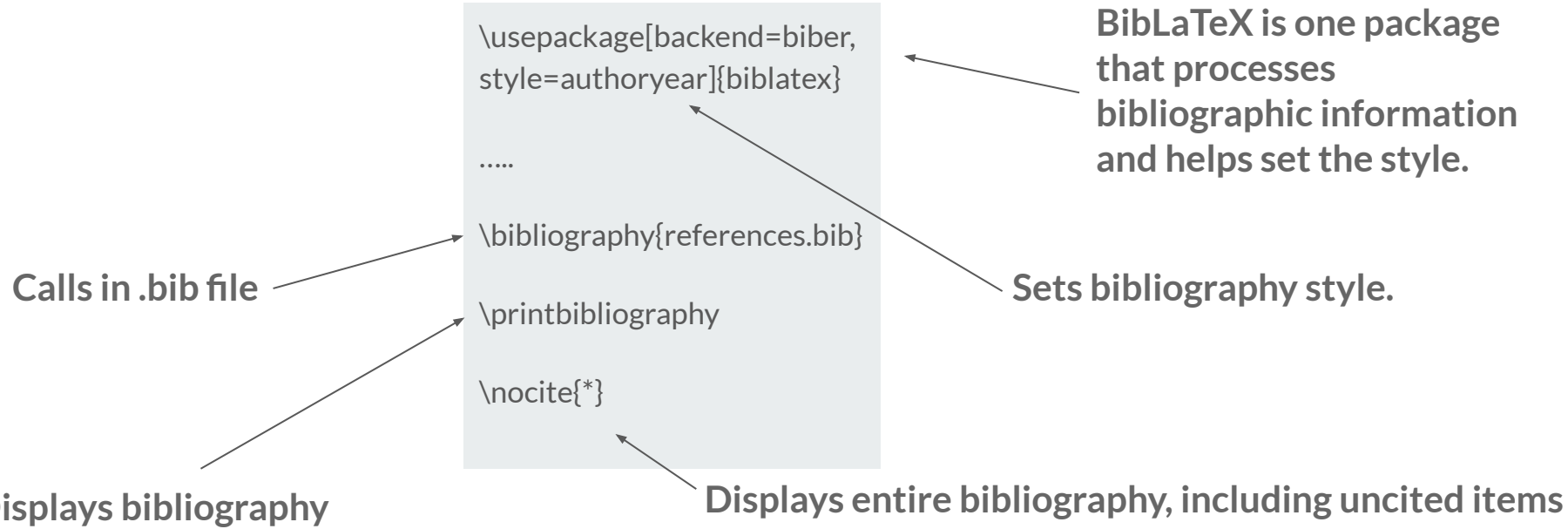
Step 2

- Create new file within project and name it references.bib
- Search for three listed articles in Google Scholar
- Paste associated BibTeX entry into references.bib file



Bibliographies

Step 3: Add packages and commands



Syntax and Output

\cite{robinson_science_2019}	Robinson et al. (2019)
\parencite{jon90}	Parenthesis: (Jones et al. 1990)
\citeauthor{jon90}	Textual: ...in Jones et al. (1990)

EXERCISE 3

Objective:

Learn to sync or upload a .bib file, use basic citation commands, and add a bibliography.

Tables & Figures

Tables

```
\usepackage{tabularx}
```

Basic Commands:

- l, r, c — column alignment
- s — column alignment for SI units
- & — ampersand separates columns
- \\ — double backslash begins new row
- \hline — horizontal line
- | — vertical line

Basic Two Column Table

```
\usepackage{tabularx}
.....
\begin{table}
\begin{tabular}{lc}
Item & Qty \\ \hline
Widget & 1 \\
Gadget & 2 \\
Cable & 3 \\
\end{tabular}
\end{table}
```

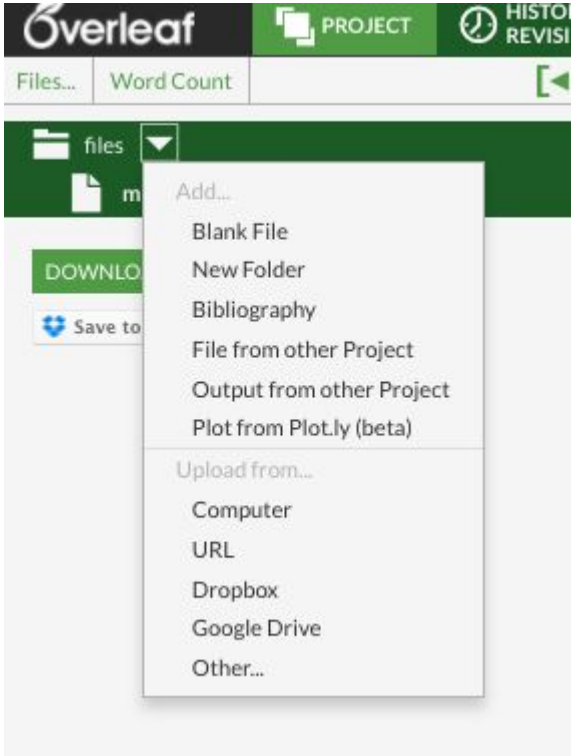
Item	Qty
Widget	1
Gadget	2
Cable	3

Uploading figures

Find files at:

https://github.com/EPS-Libraries-Berkeley/LaTeX

Download readingkitten.jpg, and upload file to Overleaf project



Uploading figures (simplest)

```
\usepackage{graphicx}

...

\includegraphics[width=0.4\textwidth]{readingkitten}
```

Figure & Table Placement

Specifier	Permission
h	Place the float here: approximately, not exactly, at the same point it occurs in the source text.
t	Position at the top of the page.
b	Position at the bottom of the page.
p	Put on a special page for floats only.
!	Override internal parameters LaTeX uses for determining "good" float positions.
H	Places the float at precisely the location in the LaTeX code. Requires the float package. This is somewhat equivalent to h!

EXERCISE 4

Objectives:

Learn the basic commands to create and edit tables.

Upload and place a figure.

Questions?

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Slides: **http://ucblib.link/MSEA2020**

Exercises: **http://ucblib.link/MSEA2020_activity**

EXTRA SLIDES FOLLOW

Syncing & uploading figures hosted elsewhere

Google Drive:
https://www.overleaf.com/help/247-how-can-i-upload-files-from-google-drive#.W4WtwhPwZE5

GitHub/Dropbox:
https://www.overleaf.com/help/343#.W4WtgxPwZE4