LaTeX for scientific writing

Marilène Cherkesly
Matthieu Gruson
Frédéric Quesnel

GERAD UQÀM

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Disclaimer

The objective consists of highlighting the main challenges and how to address them when using and collaborating with LaTeX

Using LaTeX

- We are not LaTeX experts, but LaTeX users
- You might have other good (or better!) ideas, and use them!
- In any case... when you don't know Google it! (we will get back to this later)

Structure of a LaTeX file

Preamble

```
\documentclass[10pt]{article}
\usepackage{packages}
```

Main document

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

1. Collaborating with Overleaf

Sample project

For exercices

https://fr.overleaf.com/read/vxchsmwztshv#273e48

Why use Overleaf? (we swear they don't pay us!)

Easily share your project

- Several collaborators can edit at the same time.

  1 collab. in the free version, 10 in premium.
- Share with/without edit permissions.
- Work from several computers.

No need to manage packages

- Most packages you need are already installed.
- You can always add your custom packages.

Other features

Nice editor

- Switch between WYSIWYG and code.
- Autocomplete citations and references.
- PDF in split screen or other tab.

Collaboration

- Review feature.
- Track changes (History feature).

  24h in free version, all history in premium version

Support

- Large community of users.
- Several sample projects that can be edited.

Premium features

Sync options

- Dropbox
- Git/GitHub
- Reference managers (Mendeley/Zotero)

Other premium features

- More compile time (for big projects).
- Symbol palette in the UI.

2. Labels

Why should you use labels?

Labels facilitate changes

- Easy for references
- A label will not change, but its number can change
- LaTeX automatically changes the number

Important elements to remember

Create a label

- Use `\label{...}` next to your object
- Give a name that makes sense, e.g., `\label{sec:Introduction}`
  - sec for Sections
  - eq for Equations
  - fig for Figures
  - tab for Tables
  - alg for Algorithms
- Avoid empty spaces in the names, e.g., `\label{sec Intro}`, and non-typical characters, e.g., `\label{sec:Modèle}`,
- NEVER use the "final" numbering in the labels, e.g., `\label{sec:3}`

Important elements to remember

Refer to the label

- Use `\ref{ref:abc}` in general
- Use `\eqref{eq:subtours}` for equations in parentheses (amsmath package required)

Small exercise

- In the mathematical model, label each element (objective function and constraints) and refer to these using `\eqref{}`
- Label the sections and use `\ref{}` to refer to them in the last paragraph of the Introduction
- Label Table 1 and use `\ref{}` to refer to it in the following paragraph

3. Commands

Why should you use commands?

Main reasons to use commands

- Easily change the name of a concept or the choice of notation
- Track changes in the text and make comments (e.g., with colors)

Commands for concepts

Facilitate changes in how you name a concept
An example: The multi-compartment vehicle routing problem could be MCVRP or VRPMC

In the preamble

- Create a command
  - `\newcommand{\VRPMC}{VRPMC\xspace}`
  - `\newcommand{\iToi}{item compatibility\xspace}`

In the main document

- Use your commands
  - `The \VRPMC is` → The VRPMC is
  - `We define \iToi as` → We define item compatibility as

Commands for notation

Facilitate changes to the choice of notation
Help keep track of all your used notation
An example: Using $[a_i, b_i]$ or $[\underline{w}_i, \overline{w}_i]$ for time windows

In the preamble

- Create a command
  - `\newcommand{\TWStart}{\underline{w}}`
  - `\newcommand{\TWEnd}{\overline{w}}`

In the main document

- Use your commands
  - `Each node $i$ is associated with a time window $[\TWStart_i, \TWEnd_i]$`
  - Each node i is associated with a time window $[\underline{w}_i, \overline{w}_i]$

Commands with colors

Track changes in the text and make comments

In the preamble

- Create a command, e.g.,
  `\newcommand{\marilene}[1]{{\color{magenta} #1}}`
- You can create multiple commands for multiple authors or multiple purposes using different colors

In the main document

- Use your command to change the color
  `\marilene{Marilene has changed this sentence.}`
- Marilene has changed this sentence.

Small exercise

- Create a command for a concept, referring to the vehicle routing problem as the VRP or the CVRP
- Create a command for another concept, referring to Enhanced Genetic-Tabu Search Algorithm as EGTSA
- Create a command for the variables y_r
- Create a command to add a comment in magenta

4. Bibliography using Natbib

We don't talk about BibTeX!

LaTeX bibliographies are confusing!

- Weird configuration styles
- Two competing packages : natbib vs biblatex so googling can be hard!
- You need to "compile" your bibliography

This tutorial is about natbib because...

- Better-suited for STEM-style citations
- More widely accepted
- We had to choose one
- It's the one we usually use (unless something else is required in journal templates)!

Important note

Natbib doesn't work with beamer... I had to fake my examples here!

The .bib file

Contains :

- All bibliographical informations
- The required fields depend on the publication type
- Citation keys (must be unique)

How to build

- Export *bibtex* citation from :
  - Google Scholar
  - The publication website
- Reference managers (Mendeley, Zotero) can build it for you

Notes

- Natbib will work even if some fields are missing
- Always double and triple check references: watch out for mistakes!

Simple usage

In the preamble

- Load the natbib package
- Select bibliography style
- Customize citations (more details later)

Citing in the text

- Use the `\cite{...}` command (or one of its variants, more details later)

Printing the bibliography

- Use the `\bibliography{bib_file}` command
- References the bib file
- Citations won't work if ommited!

Compiling your bibliography

Overleaf

- Nothing special to do!
  Overleaf has a magical script that works everything out
- Might need to "compile from scratch" sometimes

Other

1. `pdflatex document.tex` (figure out which .bib file to use)
2. `bibtex document` (compile the bib file)
3. `pdflatex document.tex` (figure out what references need to be used)
4. `pdflatex document.tex` (create the bibliography)

Fortunately, you only need to do that when the bib file changes

Citations formats

Citation options

- **Regular** : `\cite{...}`
- **Parenthesis :** `\citep{...}`

  Note : `(\cite{...})` creates double parenthesis!
- **Parenthesis with prefix/suffix :**
  `\citep[prefix][suffix]{...}`
  - Use case : "(see Quesnel et al. 2023 for more information)"
  - Prefix and/or suffix can be empty (but brackets are necessary)
- **Several citations at once** `\cite{label1, label2, ...}`

  also works with `\citep{...}`

Configuring citations

Package options

- **Author-year, e.g., Quesnel (2023)** :
  `\usepackage[authoryear]{natbib}`
- **Citations numérotées, e.g., [24]** :
  `\usepackage[numbers]{natbib}`

The .bst file

- Takes care of citation and bibliography formatting
- Overleaf has several predefined styles
  See `https://www.overleaf.com/learn/latex/Natbib_bibliography_styles`
- You can also include a custom .bst file and reference it
- Some publications use a custom .bst file (you can download it)
- Do NOT attempt to modify a .bst file by hand
- Use command `latex makebst` to create a custom .bst file.
  It will ask a lot of questions!

Small exercice

- Add the references "VIDAL2020401", "Konstantakopoulos2022" and "ASGHARI2021107899" (from the bib file) at the end of the sentence *The VRP has been widely studied due to its practical relevance in various industries, such as distribution, e-commerce, and public transportation*. The reference must be in parenthesis, and it must start with "see, e.g.,".
- Put the references in the literature review in parenthesis
- Change the bibliography so as it is shown in alphabetical order (google it!)

5. Google it!

Uh oh! I don't know what to do!

Google it!

Small exercise (slide 1 of 2)

I want to remove all indentations before the paragraphs (see example file).

How can I do it?

Small exercise (slide 2 of 2)

Use Google

"latex remove space before paragraph"

`https://shorturl.at/qDLUV`

Small exercise for you

- Add one affiliation per author (the affiliation must be different between the two authors), and an email address per author
- Add a footnote to refer to the Wikipedia webpage of the VRP when it appears for the first time in the introduction
- Resize Table 1 so as it fits in one page

6. Now it's your turn!

Sample project

For exercices

https://fr.overleaf.com/read/vxchsmwztshv#273e48