

# Overleaf for Writing L<sup>A</sup>T<sub>E</sub>X Documents

Jill Lagerstrom

Alex Pacheco

September 19, 2024

**T<sub>E</sub>X & L<sup>A</sup>T<sub>E</sub>X**

**Overleaf**

**Getting Started**

**Document Structure**

**Bibliography**

**Additional Information**

T<sub>E</sub>X & L<sub>A</sub>T<sub>E</sub>X

★ What is T<sub>E</sub>X?

★ What is L<sub>A</sub>T<sub>E</sub>X?

★ Advantages of  
L<sub>A</sub>T<sub>E</sub>X?

★ Disadvantages of  
L<sub>A</sub>T<sub>E</sub>X?

Overleaf

Getting Started

Document Structure

Bibliography

Additional  
Information

- T<sub>E</sub>X is a low-level markup and programming language created by Donald Knuth to typeset documents attractively and consistently.
- T<sub>E</sub>X is a programming language in the sense that it supports the if-else construct: you can make calculations with it (that are performed while compiling the document), etc., but you would find it very hard to do anything else but typesetting with it.
- The fine control T<sub>E</sub>X offers over document structure and formatting makes it a powerful and formidable tool.
- T<sub>E</sub>X is renowned for being extremely stable, for running on many different kinds of computers, and for being virtually bug free.
- T<sub>E</sub>X is a popular means by which to typeset complex mathematical formulae; it has been noted as one of the most sophisticated digital typographical systems in the world.
- Programming in T<sub>E</sub>X generally progresses along a very gradual learning curve, requiring a significant investment of time to build custom macros for text formatting.
- Document preparation systems based on T<sub>E</sub>X, consisting of collections of pre-built macros, exist making it easier for the user to create documents without the need to learn the T<sub>E</sub>X language.

T<sub>E</sub>X & L<sup>A</sup>T<sub>E</sub>X

★ What is T<sub>E</sub>X?

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

★ Advantages of L<sup>A</sup>T<sub>E</sub>X?

★ Disadvantages of L<sup>A</sup>T<sub>E</sub>X?

Overleaf

Getting Started

Document Structure

Bibliography

Additional  
Information

- L<sup>A</sup>T<sub>E</sub>X is a macro package based on T<sub>E</sub>X created by Leslie Lamport.
- Its purpose is to simplify T<sub>E</sub>X typesetting, especially for documents containing mathematical formulae.
- Popular in academia, especially in mathematics, computer science, economics, engineering, physics, statistics, and quantitative psychology.
- Many of the academic publishing houses such as American Institute of Physics, Elsevier, etc provide templates to prepare manuscripts in L<sup>A</sup>T<sub>E</sub>X.
- Since L<sup>A</sup>T<sub>E</sub>X comprises a group of T<sub>E</sub>X commands, L<sup>A</sup>T<sub>E</sub>X document processing is essentially programming.
- Using L<sup>A</sup>T<sub>E</sub>X to create documents is a WYSIWYM (What You See Is What You Mean) approach rather than WYSIWYG (What You See Is What You Get) approach of Microsoft Word and Libre Office.
- In L<sup>A</sup>T<sub>E</sub>X, you create a text file in L<sup>A</sup>T<sub>E</sub>X markup, which then needs to be compiled to produce the final document, most commonly is postscript (ps) or portable document format (pdf).
- The final document can be viewed uniformly on any Operating System using any version of the document viewer.

## T<sub>E</sub>X & L<sup>A</sup>T<sub>E</sub>X

★ What is T<sub>E</sub>X?

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

★ Advantages of  
L<sup>A</sup>T<sub>E</sub>X?

★ Disadvantages of  
L<sup>A</sup>T<sub>E</sub>X?

Overleaf

Getting Started

Document Structure

Bibliography

Additional  
Information

- Document sources can be read with any text editor.
- You can concentrate purely on the structure and contents of the document, not get caught up with superficial layout issues.
- You don't need to manually adjust fonts, text sizes, line heights, or text flow for readability, as L<sup>A</sup>T<sub>E</sub>X takes care of them automatically.
- In L<sup>A</sup>T<sub>E</sub>X the document structure is visible to the user, and can be easily copied to another document.
- The layout, fonts, tables and so on are consistent throughout the document.
- Mathematical formulae can be easily typeset.
- Indexes, footnotes, citations and references are generated easily.
- Since the document source is plain text, tables, figures, equations, etc. can be generated programmatically with any language.
- You are forced to structure your documents correctly.

## T<sub>E</sub>X & L<sup>A</sup>T<sub>E</sub>X

\* What is T<sub>E</sub>X?

\* What is L<sup>A</sup>T<sub>E</sub>X?

\* Advantages of  
L<sup>A</sup>T<sub>E</sub>X?

\* Disadvantages of  
L<sup>A</sup>T<sub>E</sub>X?

Overleaf

Getting Started

Document Structure

Bibliography

Additional  
Information

- L<sup>A</sup>T<sub>E</sub>X is WYSIWYM and not WYSIWYG approach  
i.e. you can't see what the final version will look like while typing.
- You need to know the necessary commands for the markup language.  
i.e. there is no drop-down menu to create the document content such as equations, tables, inserting figures etc, you need to know how to enter those in a text editor.
- It can sometimes be difficult to obtain a certain look for the document.

[T<sub>E</sub>X & L<sub>A</sub>T<sub>E</sub>X](#)

[Overleaf](#)

**\* What is Overleaf?**

[\\* Why use Overleaf?](#)

[\\* Lehigh's Overleaf  
Commons  
Subscription](#)

[Getting Started](#)

[Document Structure](#)

[Bibliography](#)

[Additional  
Information](#)

- an online collaborative writing and publishing tool that makes the whole process of writing, editing and publishing scientific documents much quicker and easier.
- provides the convenience of an easy-to-use L<sub>A</sub>T<sub>E</sub>X editor with real-time collaboration and the fully compiled output produced automatically in the background as you type.
- makes the journal submission process smoother for L<sub>A</sub>T<sub>E</sub>X users across many academic publishers.

T<sub>E</sub>X & L<sub>A</sub>T<sub>E</sub>X

Overleaf

\* What is Overleaf?

\* Why use Overleaf?

\* Lehigh's Overleaf  
Commons  
Subscription

Getting Started

Document Structure

Bibliography

Additional  
Information

- cloud based product that only needs a web browser.
- effortless sharing with collaborators.
- compiles your project in the background, so you can see the output PDF right away.
- real-time commenting and integrated chat, you can discuss your work without having to switch to email, printed versions or any other tool.
- Rich Text and L<sub>A</sub>T<sub>E</sub>X modes if you prefer to see less of the code when you're writing
- Overleaf shows you errors and warnings as you go, so you can catch them early, and it shows them inline, so you don't have to find them in the L<sub>A</sub>T<sub>E</sub>X log.
- Write your thesis, create a calendar, make amazing presentations with the beamer package and create posters to showcase your work, all from a wide selection of popular templates.
- The real-time preview also helps when you're working with complicated tables, tikz figures and pgfplots graphs.



TeX & LaTeX

Overleaf

\* What is Overleaf?

\* Why use Overleaf?

\* Lehigh's Overleaf  
Commons  
Subscription

Getting Started

Document Structure

Bibliography

Additional  
Information

- Overleaf Professional accounts – for students, faculty and staff.
  - ◆ Unlimited collaborators
  - ◆ Full document history
  - ◆ Reference Manager Sync
  - ◆ Dropbox and Git/Github integration
  - ◆ 20GB of storage
- Hassle-free license management – users simply register with their institutional email address on Overleaf (or add it to their existing Overleaf account) to join your Overleaf Commons license and receive their upgrade automatically.

T<sub>E</sub>X & L<sub>A</sub>T<sub>E</sub>X

Overleaf

Getting Started

\* How do I Sign Up

\* How do I Create a  
document

\* My First L<sub>A</sub>T<sub>E</sub>X  
Document

Document Structure

Bibliography

Additional  
Information

- Visit <https://www.overleaf.com/register>
- Sign up with your email address, Google or ORCID.
  - ◆ Your NJIT email address and Google account is valid as long as you are a student, staff or faculty.
  - ◆ Your Overleaf account is tied to the registered email address. If your email address is deactivated, you lose access to your overleaf account.
  - ◆ Consider using your personal email or Google account for registration.
  - ◆ Go to Account Settings and add your NJIT email as your secondary email to convert to a Pro account.

TeX & LaTeX

Overleaf

Getting Started

\* How do I Sign Up

\* **How do I Create a document**

\* My First LaTeX Document

Document Structure

Bibliography

Additional Information

- Click on New Project in the left sidebar.

- Choose from

**Blank Project** : Start with a empty .tex file.

**Example Project** : Start with an example article that overleaf provides.

**Upload Project** : Upload a zip file containing an existing LaTeX project i.e. at least one .tex file.

**Import from Github** : Import an existing LaTeX project from your Github account.

T<sub>E</sub>X & L<sup>A</sup>T<sub>E</sub>X

Overleaf

Getting Started

\* How do I Sign Up

\* How do I Create a document

\* My First L<sup>A</sup>T<sub>E</sub>X Document

Document Structure

Bibliography

Additional Information

- Start with a Blank Document and add the following lines to it

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

\title{My First Document}
\author{Enter your name}
\date{\today}

\begin{document}

\maketitle
\tableofcontents

\section{My First Section}\label{section1}
Hello World!

\section{My Second Section}
In Sec. \ref{section1}, we said Hello to the World.

\end{document}
```

- Watch the document compile on the right window. Click "Recompile" for compiling the document on demand.

- When L<sup>A</sup>T<sub>E</sub>X processes an input file, it expects it to follow a certain structure.
- Every L<sup>A</sup>T<sub>E</sub>X input file must contain the commands,

```
\documentclass{...}  
  
\begin{document}  
...  
\end{document}
```

- The area between `\documentclass{...}` and `\begin{document}` is called the **Preamble**.
- The document content goes between the `\begin{document}` and `\end{document}` commands,

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

- The Preamble is anything that comes before the main document.
- It is used for
  - ◆ Defining the type of document.
  - ◆ Defining the top matter i.e. title, author, etc.
  - ◆ Applying global formatting including changing page layout from the default.
  - ◆ Including packages to add functionality.

- The first uncommented line of the  $\text{\LaTeX}$  document needs to describe the type of document that you are creating using  
 $\text{\textbackslash documentclass}[\text{options}]\{\text{documenttype}\}$
- $\text{\LaTeX}$  can be used to create documents of various types
  - ① article
  - ② report
  - ③ book
  - ④ letter
  - ⑤ beamer<sup>1</sup>, powerdot<sup>2</sup>, **prosper or seminar**<sup>3</sup> for Presentations
- The difference between article, report and book is in the document structure and presentation:
- In article type, there is no chapter and the title page and document content can appear on the first page.
- In report and book, the title page is the first page and document content begins on the second page onwards.
- In article and report, there is an abstract environment to write the abstract of the article or report that you are writing.

---

<sup>1</sup> For Tutorial, visit <http://www.hpc.lsu.edu/training/archive/tutorial.php>

<sup>2</sup> THIS PRESENTATION, style file included in downloads

<sup>3</sup> Not popular anymore, use beamer or powerdot

- The options to documentclass are used to define a predetermined structure for the document.
- The most commonly used options are defining
  - ◆ font size: 10pt (default), 11pt or 12pt
  - ◆ paper size: letterpaper (default), legalpaper, executivepaper, a4paper, a5paper or b5paper
  - ◆ orientation: portrait (default) or landscape
  - ◆ page format: onecolumn (default) or twocolumn
- Options that depend on document type
  - ◆ Where to print page numbers for book, report and article
    - oneside** page numbers are printed the same on even and odd pages, default for article & report
    - twoside** page number appears on the right side for odd pages and on the left for even pages, default for book
  - ◆ Where new chapters begin in the book and report class
    - openright** chapters start on the right hand insert blank page if necessary i.e. odd numbered page
    - openany** chapters always start on the next page
  - ◆ Where the title appears
    - ★ In book and report classes, the title appears on the first page separate from the document content
    - ★ In article class, the title appears on the first page followed by the document content
    - ★ Use **titlepage** and **notitlepage** to override this standard behavior.



- Other options commonly used
  - `leqno` : display equation numbers on the left rather than the default right
  - `fleqn` : displayed formulas are flushed left instead of default centered
  - `draft` : mark lines that are too wide with a thick black bar
  - `final` : default, do not mark lines that are too wide.
- Add some options to documentclass to create your second document.

```
\documentclass[12pt,twocolumn,fleqn]{article}
```

- To create a title page L<sup>A</sup>T<sub>E</sub>X has three commands.
  - ◆ `\title{Title}` where Title is the title of your article, book or report.
  - ◆ `\author{FirstName LastName}`, if there are multiple authors, list them all delimited by a comma (,) or and.
  - ◆ `\date{\today}` to set the date when the article was created i.e. today  
If the date required is different from today, add the date that you need as in  
`\date{Feb. 29, 2016}`
- If you are publishing a journal article, please see their L<sup>A</sup>T<sub>E</sub>X templates and style files. Most of their style and class files define additional commands such as `\affiliation{...}`, `\institution{...}`, etc.
- To create the actual page, you need to add `\maketitle` in your document i.e. after the `\begin{document}` command.
- The `\maketitle` is almost always the first line of your document content.

```
\documentclass[12pt,twocolumn,fleqn]{article}
\title{Simple \LaTeX{} Document}
\author{Alex Pacheco, Bhupender Thakur, Feng Chen and Le Yan}
\date{\today}
\begin{document}
\maketitle
\end{document}
```

- Document Content i.e. everything between the  $\text{\begin{document}}$  and  $\text{\end{document}}$  is partitioned into

Section	Command	Level	Comment
part	$\text{\part{title}}$	-1	not in letters
chapter	$\text{\chapter{title}}$	0	only in book and report
section	$\text{\section{title}}$	1	not in letters
subsection	$\text{\subsection{title}}$	2	not in letters
subsubsection	$\text{\subsubsection{title}}$	3	not in letters
paragraph	$\text{\paragraph{title (optional)}}$	4	not in letters
subparagraph	$\text{\subparagraph{title (optional)}}$	5	not in letters

- $\text{\LaTeX}$  provides 7 levels of depth for defining sections. The depth levels for the various commands are listed in column three in the above table.
- The depth level of a section affects whether that section appears in the table of content or not. This can however be changed as we will see in the next few slides.
- Since  $\text{\LaTeX}$  is used very often for writing scientific articles and reports, there are environments defined to create Abstract, Appendices and Bibliographies.

- Numbering of the sections is performed automatically by LaTeX.
- Parts get roman numerals (Part I, Part II, etc.);
- chapters and sections get decimal numbering, and
- appendices (which are just a special case of chapters, and share the same structure) are lettered (A, B, C, etc.).
- You can change the depth to which section numbering occurs, so you can turn it off selectively. By default it is set to 2.
- To change the depth level, use the `\setcounter` command.
- For example, to change depth to only include chapters: `\setcounter{secnumdepth}{1}`
- You can change the numbering mechanism of the sectioning commands as well as lists, captions, equations, tables, figures etc. We'll discuss more about this when we get to user defined commands.

- As most research papers have an abstract, there are predefined commands for telling  $\text{\LaTeX}$  which part of the content makes up the abstract.
  - ◆ This should appear in its logical order, therefore, after the top matter, but before the main sections of the body.
  - ◆ *This command is available for the document classes article and report, but not book.*
  - ◆ In document class report, the abstract appears on a separate page without a page number.
  - ◆ In document class article, the abstract comes after the title heading on the first page.

```
\begin{abstract}
```

```
In this article we discuss how to create simple \LaTeX{} documents. Topics include
    structuring a document, list environment, inserting equations and figures,
    creating tables and more.
```

```
\end{abstract}
```

## Abstract

In this article we discuss how to create simple  $\text{\LaTeX}$  documents. Topics include structuring a document, list environment, inserting equations and figures, creating tables and more.

- The following commands are available for producing automatic, sequential sectioning  
`\part`, `\chapter`, `\section`, `\subsection`, `\subsubsection`, `\paragraph`, `\subparagraph`
- Except for `\part`, these commands form a sectioning hierarchy.
- In document class report and book, the highest sectioning level is `\chapter` while in article class, it is `\section`.
- The chapters are divided into sections using the `\section` command, which is further divided into subsections using the `\subsection` command and so on.
- The syntax for these commands is `\command[short title]{title}` or `\command*{title}`
- In the first form, the section is given the next number in the sequence which is then printed together with a heading using the text "title".
- The text "short title" becomes the entry in the table of contents and page head. If "short title" is omitted, then the "title" is used.
- In the second form (with \*), no section number is printed and no entry is created in the table of contents.
- The highest sectioning command is given a single number (1,2,...), the second highest command then creates a double number (1.1, 2.3, ...) and so on.
- The paragraph and subparagraph commands are not numbered.
- For each sectioning command, there is an internal counter that is incremented by one every time that command is called and reset to zero on every call to a higher sectioning command.

- The sectioning command, `\part` is a special case and does not affect the numbering of other sectioning commands.
- The `\part` are usually numbered with Uppercase Roman Numerals as in Part I, Part IV, etc.
- The `\part` is used to divide your document into multiple parts which can be independent of each other.

```
\documentclass{article}

\title{Report of Projects I'm working on}
\author{Alex Pacheco}
\date{Oct 30, 2013}
\begin{document}
\maketitle
\part{First Project}
\section{Introduction}
Some stuff I'm doing
\section{Results}
Some useless results that I got
\section{Conclusion}
Unsuccessful Project ... keep working
\part{Second Project}
\section{Introduction}
Some stuff I'm doing
\section{Results}
More useless results
\section{Conclusion}
Unsuccessful Project ... keep working
\part{Third Project}
\section{Introduction}
Some stuff I'm doing
\section{Results}
Finally got some useful results
\section{Conclusion}
Successful Project ... boss says no, can't graduate ... keep
    working
\end{document}
```

```
\documentclass{report}

\title{Report of Projects I'm working on}
\author{Alex Pacheco}
\date{Oct 30, 2013}
\begin{document}
\maketitle
\part{First Project}
\chapter{Project Title}
\section{Introduction}
Some stuff I'm doing
\section{Results}
Some useless results that I got
\section{Conclusion}
Unsuccessful Project ... keep working
\part{Second Project}
\chapter{Project Title}
\section{Introduction}
Some stuff I'm doing
\section{Results}
More useless results
\section{Conclusion}
Unsuccessful Project ... keep working
\part{Third Project}
\chapter{Project Title}
\section{Introduction}
Some stuff I'm doing
\section{Results}
Finally got some useful results
\section{Conclusion}
Successful Project ... boss says no, can't graduate ... keep
    working
\end{document}
```

- An appendix is introduced with the declaration `\appendix`
- The `\appendix` resets the section counter in article and chapter counter in book and report.
- The numbering for the sectioning commands is also changed from numerals to capital letters, A, B, ...
- The word "Chapter" is replaced by "Appendix" so that subsequent chapter headings are preceded by "Appendix A", "Appendix B", etc.
- The numbering of lower sectioning commands contain the letter in place of chapter number, for e.g. A.2.1

```
\appendix
\section{My First Appendix}
...
\subsection{Subsection in My First Appendix}
...
```



- Since the various sectioning commands are numbered automatically, the chapter, section, etc numbers may not be known at the time of writing the document and may change as more content is added.
- $\text{\LaTeX}$  has a cross-reference system, which allows you to label the various sectioning commands to refer to them at point in the document.
- To label a command, use `\label{name}` as in `\chapter{Introduction}\label{chap:intro}` or `\section{My First document}\label{first}`
- To reference the labeled section, use `\ref{name}` as in

```
\chapter{Introduction}\label{chap:intro}
\section{My First document}\label{sec:first}
In section \ref{sec:first} of Chapter \ref{chap:intro}, we wrote our first \LaTeX{} document
```

- The cross-reference commands `\label{name}` and `\ref{name}` can also be used for other content such as tables, figures and equations.
- To get the cross-referencing to show up correctly, you need to compile your document i.e. run `latex filename` or `pdflatex filename` two times.
- The first time, the compiler stores the labels with the right number to be used for referencing.
- The second time, it replaces `\ref{name}` with the right number.
- The name that you use in the label command must be unique else the compiler will complain that there are multiply defined references.

- All auto-numbered headings get entered in the Table of Contents (ToC) automatically.
- Just add the command `\tableofcontents` at the point where you want it printed (usually after the title page).
- Entries for the ToC are recorded each time you process your document, and reproduced the next time you process it, so you need to re-run  $\text{\LaTeX}$  one extra time to ensure that all ToC pagenumber references are correctly calculated.
- The commands `\listoffigures` and `\listoftables` work in exactly the same way as `\tableofcontents` to automatically list all your tables and figures, usually created after the TOC.
- The `\tableofcontents` commands normally shows only numbered section headings.
- To add extra entries, use the `\addcontentsline` command

```
\subsection*{Preface}
\addcontentsline{toc}{subsection}{Preface}
```

- This will format an unnumbered ToC entry for "Preface" in the "subsection" style.
- To change the title of the TOC, you have to use this command `\renewcommand{\contentsname}{New table of contents title}` in your document preamble.
- The default ToC will list headings of level 3 and above. Use the `\setcounter` command to change this depth. For e.g. `\setcounter{tocdepth}{4}`.

```
\documentclass[12pt,fleqn]{article}

\title{Simple \LaTeX{} Document}
\author{Alex Pacheco}
\date{\today}

\begin{document}
\maketitle
\tableofcontents

\begin{abstract}
  In this article we discuss how to create simple \LaTeX{} documents. Topics include structuring a document, list environment,
  inserting equations and figures, creating tables and more.
\end{abstract}

\section{Section 1}
\subsection{Section 1.1}
\subsection{Section 1.2}
\subsection*{Section nonumber}
\addcontentsline{toc}{subsection}{Section nonumber}
  blah blah blah

\section{Section 2}
\subsection{Section 2.1}
\subsubsection{Section 2.1.1}
\subsubsection{Section 2.1.2}
\paragraph{Paragraph} no numbering for this paragraph
\subparagraph{Subparagraph} no numbering for this subparagraph
\subsection{Section 2.2}
  blah blah blah

\appendix
\section{Appendix A}
\subsection{Appendix A.1}
  blah blah blah

\section{Appendix B}
\subsection{Appendix B.1}
\subsubsection{Appendix B.1.1}
  blah blah blah

\end{document}
```

# Simple L<sup>A</sup>T<sub>E</sub>X Document

Alex Pacheco

October 25, 2013

## Contents

<b>1</b>	<b>Section 1</b>	<b>2</b>
1.1	Section 1.1 . . . . .	2
1.2	Section 1.2 . . . . .	2
	Section nonumber . . . . .	2
<b>2</b>	<b>Section 2</b>	<b>2</b>
2.1	Section 2.1 . . . . .	2
2.1.1	Section 2.1.1 . . . . .	2
2.1.2	Section 2.1.2 . . . . .	2
2.2	Section 2.2 . . . . .	2
<b>A</b>	<b>Appendix A</b>	<b>2</b>
A.1	Appendix A.1 . . . . .	2
<b>B</b>	<b>Appendix B</b>	<b>2</b>
B.1	Appendix B.1 . . . . .	2
B.1.1	Appendix B.1.1 . . . . .	2

## Abstract

In this article we discuss how to create simple L<sup>A</sup>T<sub>E</sub>X documents. Topics include structuring a document, list environment, inserting equations and figures, creating tables and more.

## 1 Section 1

### 1.1 Section 1.1

### 1.2 Section 1.2

### Section nonumber

blah blah blah

## 2 Section 2

### 2.1 Section 2.1

#### 2.1.1 Section 2.1.1

#### 2.1.2 Section 2.1.2

**Paragraph** no numbering for this paragraph

**Subparagraph** no numbering for this subparagraph

### 2.2 Section 2.2

blah blah blah

## A Appendix A

### A.1 Appendix A.1

blah blah blah

## B Appendix B

### B.1 Appendix B.1

#### B.1.1 Appendix B.1.1

blah blah blah

- In LaTeX, the document type determines its overall general properties, such as layout and sectioning.
- However, it is possible to change the way certain commands work by invoking specific packages which may define new commands to add features that are not part of standard LaTeX.
- A LaTeX packages is nothing more than a set of LaTeX or TeX commands stored in a file with an extension .sty.
- To use a package, add `\usepackage[options]{packagename}` in the preamble of the document. The `[options]` is optional and some packages do not provide options at all.
- There are hundreds of useful packages and listing them all is beyond the scope of this tutorial.
- Some of the most commonly used packages are:
  - `amsmath` contains the advanced math extensions for LaTeX
  - `graphicx` manage external pictures.
  - `color` adds support for colored text.
  - `geometry` easy management of document margins and the document page size.
  - `inputenc` choose the encoding of the input text.
  - `babel` provides the internationalization of LaTeX. It has to be loaded in any document, and you have to give as an option the main language you are going to use in the document. e.x. `\usepackage[english]{babel}`
  - `hyperref` It gives LaTeX the possibility to manage links within the document or to any URL when you compile in PDF.
  - `cite` assists in citation management.
  - `natbib` gives additional citation options and styles.

- As your work grows, your  $\text{\LaTeX}$  file can become unwieldy and confusing, especially if you are writing a long article with substantial, discrete sections, or a full-length book.
- In such cases it is good practice to split your work into several files.
- For example, if you are writing a book, it makes a lot of sense to write each chapter in a separate `.tex` file.
- $\text{\LaTeX}$  makes this very easy thanks to two commands:  
`\input{filename}`  
and  
`\include{filename}`
- Both these commands process the contents of `filename.tex`.
- When the compiler processes your base file (the file that contains these statements) and reaches the command `\input` or `\include`, it reads `filename.tex` and processes its content in accordance with the formatting commands specified in the base file.
- This way you can put all the formatting options in your base file and then `\input` or `\include` the files which contain the actual content of your work.

- There are some differences between these two commands:
  - ① You cannot nest `\include` statements within a file added via `\include`, whereas `\input`, on the other hand, allows you to call files which themselves call other files, ad infinitum (well, nearly!).  
You can, however, `\include` a file which contains one or more `\input` commands.
  - ② `\include` will force a page break (which makes it ideal for a book's chapters), whereas the `\input` command does not.

```
\documentclass{article}
\begin{document}
\input{Section_1}
\input{Section_2}
\input{Section_3}
\input{Section_4}
\input{Section_5}
\end{document}
```

- The `\includeonly{filename1,filename2}` allows you to compile your document by including only the files listed in the curly braces.

```
\documentclass{book}
\includeonly{Chapter_1,Chapter_4} % compile just chapters 1 and 4, space characters not permitted
\begin{document}
\include{Chapter_1}           % omit the '.tex' extension
\include{Chapter_2}
\include{Chapter_3}
\include{Chapter_4}
\end{document}
```

- For any academic/research writing, incorporating references into a document is an important task.
- Fortunately, LaTeX has a variety of features that make dealing with references much simpler, including built-in support for citing references.
- However, a much more powerful and flexible solution is achieved thanks to an auxiliary tool called BibTeX (which comes bundled as standard with LaTeX).
- BibTeX provides for the storage of all references in an external, flat-file database.
- This database can be referenced in any LaTeX document, and citations made to any record that is contained within the file.
- This is often more convenient than embedding them at the end of every document written; a centralized bibliography source can be linked to as many documents as desired (write once, read many!).
- bibliographies can be split over as many files as one wishes, so there can be a file containing sources concerning topic A (a.bib) and another concerning topic B (b.bib).
- When writing about topic AB, both of these files can be linked into the document (perhaps in addition to sources ab.bib specific to topic AB).



- LaTeX provides an environment called thebibliography that you have to use where you want the bibliography; that usually means at the very end of your document, just before the `\end{document}` command.

### Example

```
\begin{thebibliography}{9}
\bibitem{lamport94}
  Leslie Lamport,
  \emph{\LaTeX: A Document Preparation System}.
  Addison Wesley, Massachusetts,
  2nd Edition,
  1994.
\end{thebibliography}
```

- thebibliography is a keyword that LaTeX recognizes as everything between the begin and end tags as being data for the bibliography.
- The mandatory argument is telling LaTeX how wide the item label will be when printed.
- In the above example, reference label with only one digit i.e. upto 9 references will be printed.
- To actually cite a given document, go to the point where you want the citation to appear, and use the following: `\cite{cite_key}`, where the cite\_key is that of the bibitem you wish to cite.
- To cite the above example, type `\cite{lamport94}`.

- Instead of writing the bibitems at the end of each document, it would be convenient if one can create a database of such bibliographic entries which will then be available for all documents.
- BIBTeX is an auxiliary program to LaTeX that automatically constructs a bibliography by searching one or more databases.
- To this end, the LaTeX file must contain the command `\bibliography{database1,database2,...}` at the point where the bibliography is to appear.
- The argument database1, database2 is the root name of the database that are to be searched and has an extension .bib.
- The reference is again made with the `\cite{key}` or `\nocite{key}` command.
- The style of the bibliography can be selected using the command `\bibliographystyle{style}` where style can one of the following values,
  - plain** : The entries in the bibliography are ordered alphabetically, each is assigned a running number in square brackets.
  - unsrt** : The entries are ordered according to their first references by the cite and nocite commands.
  - alpha** : Same as plain but the markers are an abbreviation of the author's name plus year of publication.
  - abbrv** : Same as plain but bibliography listing is shortened by abbreviating first names, months and journal names.

- The bibliography database is a plain text file with a .bib extension,

```
@article{greenwade93,
  author = 'George D. Greenwade'',
  title  = 'The {C}omprehensive {T}ex {A}rchive {N}etwork ({CTAN})'',
  year   = '1993'',
  journal = 'TUGBoat'',
  volume = '14'',
  number = '3'',
  pages  = '342--351''
}
@book{goossens93,
  author = 'Michel Goossens and Frank Mittelbach and Alexander Samarin'',
  title  = 'The LaTeX Companion'',
  year   = '1993'',
  publisher = 'Addison-Wesley'',
  address = 'Reading, Massachusetts''
}
```

- Common types for entries in a BibTeX file are
  - @article** : An article from a magazine or a journal.
  - @book** : A published book.
  - @proceedings** : The proceedings of a conference. Can also use conference.
  - @phdthesis** : Ph.D. thesis.
  - @manual** : Technical manual.
  - @inbook** : A section of a book without its own title.
  - @inproceedings** : An article in a conference proceedings.
  - @techreport** : Technical report from educational, commercial or standardization institution.
  - @unpublished** : An unpublished article, book, thesis, etc.

- Using the standard LaTeX bibliography support, you will see that each reference is numbered and each citation corresponds to the numbers.
- The numeric style of citation is quite common in scientific writing.
- In other disciplines, the author-year style, e.g., (Roberts, 2003), such as Harvard is preferred.
- The **natbib** package is used to get such an output and it can supersede LaTeX's own citation commands.
- To use the natbib citation style, you need to add `\usepackage[options]{natbib}` to the document preamble.
- The options to the **natbib** package are
  - round** : Parenthesis ( ) which is the default i.e. citation reference will be included within ( )
  - square** : Square Brackets [ ]
  - curly** : Curly Braces { }
  - angle** : Angle brackets < >
  - colon** : multiple citations are separated by semi-colons (default)
  - comma** : multiple citations are separated by commas
  - authoryear** : author year style citations (default)
  - numbers** : numeric citations
  - super** : superscripted numeric citations
  - sort** : multiple citations are sorted into the order in which they appear in the references section
  - sort&compress** : as sort, compressing multiple numeric citations where possible

- The **natbib** package gives access to more citation commands as well as additional bibliography styles that are commonly used in scientific journals.

Natbib Commands	
Citation Command	Output
<code>\cite{goossens93}</code>	Goossens et al. (1993)
<code>\citep{goossens93}</code>	(Goossens et al., 1993)
<code>\citet{*goossens93}</code>	Goossens, Mittlebach, and Samarin (1993)
<code>\citep{*goossens93}</code>	(Goossens, Mittlebach, and Samarin, 1993)
<code>\citeauthor{goossens93}</code>	Goossens et al.
<code>\citeauthor{*goossens93}</code>	Goossens, Mittlebach, and Samarin
<code>\citeyear{goossens93}</code>	1993
<code>\citeyearpar{goossens93}</code>	(1993)
<code>\citealt{goossens93}</code>	Goossens et al. 1993
<code>\citealp{goossens93}</code>	Goossens et al., 1993
<code>\citetext{priv.\ comm.}</code>	(priv. comm.)

Natbib-compatible styles	
Style	Description
plainnat	natbib-compatible version of plain
abbrvnat	natbib-compatible version of abbrv
unsrnat	natbib-compatible version of unsrt
apsrev	natbib-compatible style for Physical Review journals
rmpaps	natbib-compatible style for Review of Modern Physics journals
IEEEtranN	natbib-compatible style for IEEE publications
achemso	natbib-compatible style for American Chemical Society journals
rsc	natbib-compatible style for Royal Society of Chemistry journals

- Creating L<sup>A</sup>T<sub>E</sub>X Presentations: <https://www.overleaf.com/learn/latex/Beamer>
  - ① Beamer: The most popular package for creating presentations.
    - ◆ Template: <https://github.com/alexpacheco/LehighBeamer>
  - ② Powerdot: <https://ctan.org/pkg/powerdot?lang=en>
    - ◆ Source code of Slides: <https://github.com/alexpacheco/latex>
- Creating L<sup>A</sup>T<sub>E</sub>X Posters <https://www.overleaf.com/learn/latex/Posters>
  - ① baposter
    - ◆ From a seminar I gave a few summers ago
    - ◆ My last research poster
  - ② beamerposter
  - ③ tikzposter

