

Technical Report Writing & Research Methodology

Introduction to Latex in Overleaf

Course Instructor

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What is Latex?

- LaTeX (pronounced LAY-tek or LAH-tek) is a tool used to create professional-looking documents.
- Based on the WYSIWYM (what you see is what you mean) idea
 - You only have to focus on the contents of your document and the computer will take care of the formatting.
- Users can enter plain text and let LaTeX take care of the formatting (Unlike MS word).

Why use LaTeX?

- LaTeX is used all over the world for scientific documents, books, as well as many other forms of publishing.
- Can create beautifully typeset documents.
- Enables the user to tackle the complicated parts of typesetting like
 - Inputting mathematics.
 - Creating tables of contents.
 - Referencing and creating bibliographies and many more.
- Has a number of open source packages providing endless formatting possibilities.

How does it work?

- You write your document in plain text with **commands** that describe its structure and meaning.
- The LaTeX program processes your text and commands to beautifully formatted document.

The rain in Spain falls `\emph{mainly}` on the plain.



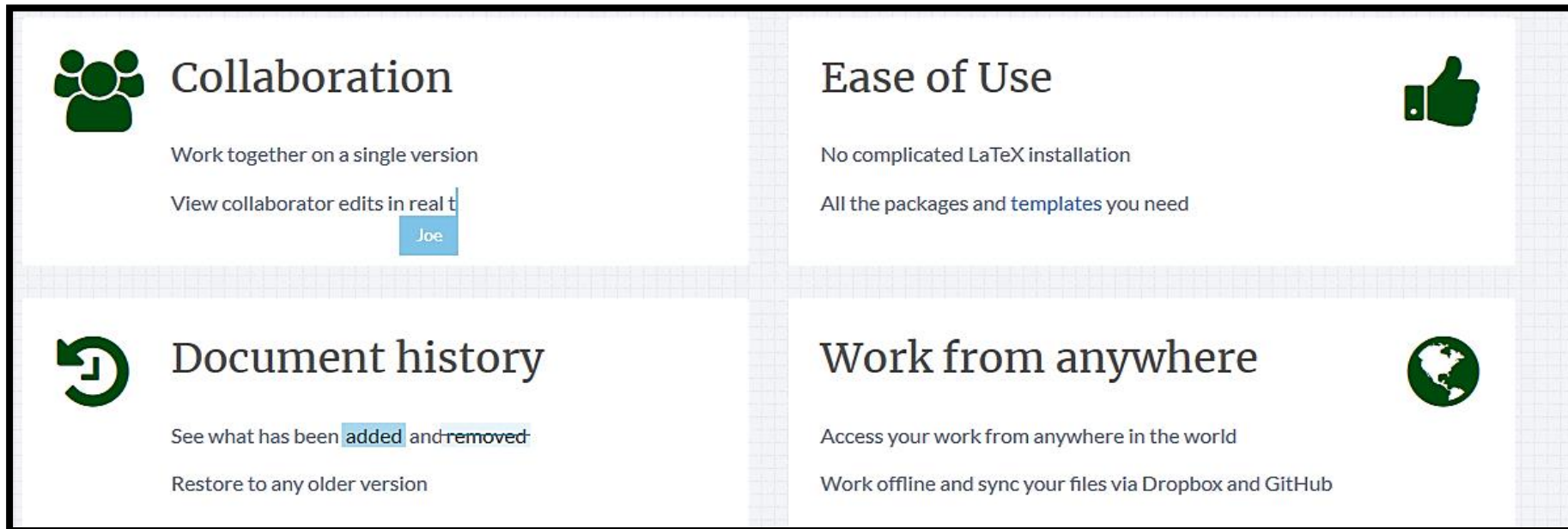
The rain in Spain falls *mainly* on the plain.

LaTeX modes of Usage

- LaTeX can be used either in offline mode or online mode.
- For using LaTeX offline, you need to install softwares like MiKTeX (backend-runs all the packages) and text editors like TeXstudio, WinEdt, TexNic (front end- where you write all your LaTeX code).
- For online mode, Overleaf is used.
- Overleaf is an online LaTeX editor that is easy to use. No installation, real-time collaboration, hundreds of LaTeX templates, and more.

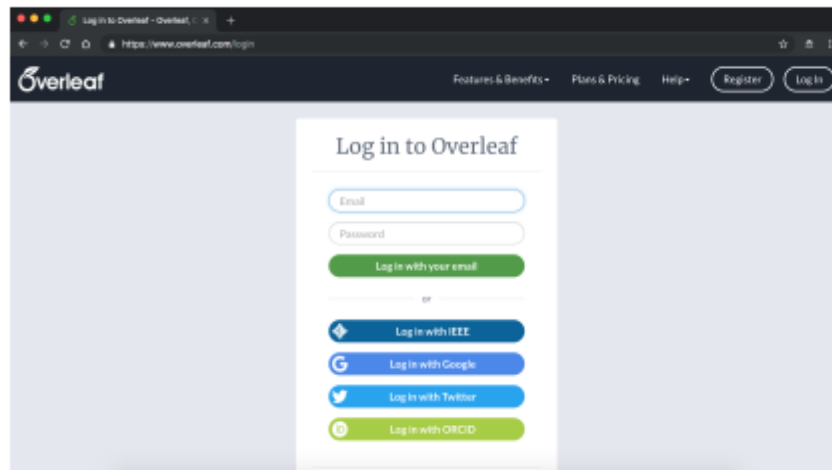
Overleaf

- Templates for papers, presentations, newsletters, syllabi, books.
- Online collaboration platform.
- Output: nice PDF files.

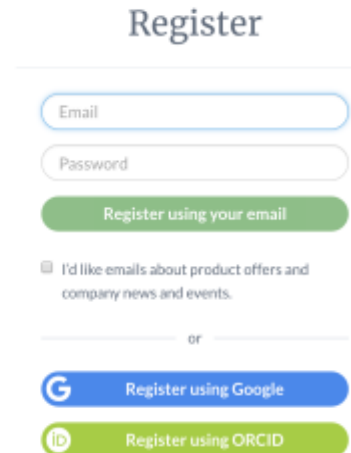


Login/Signup with Overleaf

Login or Register with Overleaf - <https://www.overleaf.com/>

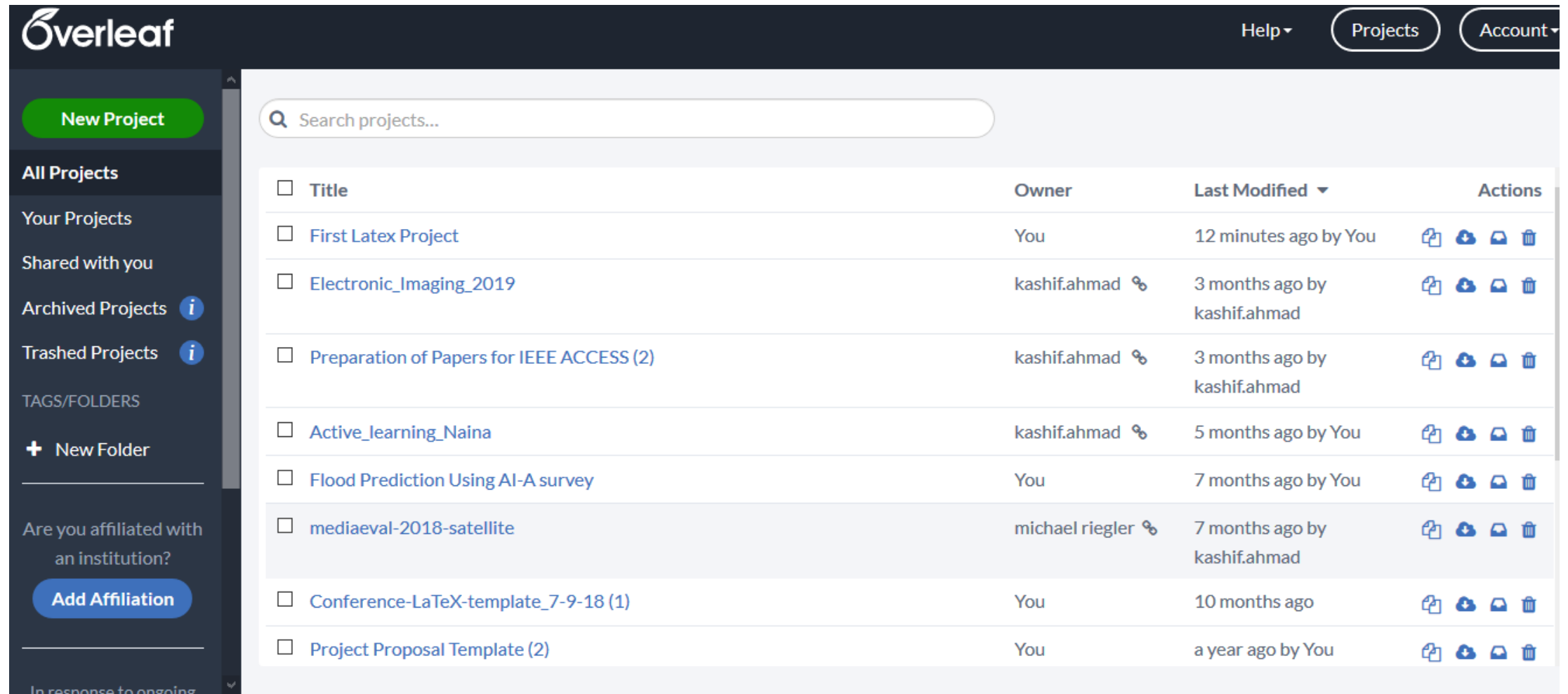


A screenshot of the Overleaf login page. The browser address bar shows 'https://www.overleaf.com/login'. The page has a dark header with the Overleaf logo and navigation links: 'Features & Benefits', 'Plans & Pricing', 'Help', 'Register', and 'Log In'. The main content area is titled 'Log in to Overleaf' and contains a login form with fields for 'Email' and 'Password', a 'Log in with your email' button, and social login options: 'Log in with IEEE', 'Log in with Google', 'Log in with Twitter', and 'Log in with ORCID'.



A screenshot of the Overleaf register page. The title is 'Register'. It features a form with 'Email' and 'Password' input fields, followed by a 'Register using your email' button. Below this is a checkbox labeled 'I'd like emails about product offers and company news and events.' and a horizontal line with the word 'or' in the center. At the bottom, there are two buttons: 'Register using Google' and 'Register using ORCID'.

Overleaf Structure



The screenshot displays the Overleaf web interface. The top navigation bar includes the Overleaf logo, a 'Help' dropdown, and buttons for 'Projects' and 'Account'. The left sidebar contains a 'New Project' button, a list of project categories (All Projects, Your Projects, Shared with you, Archived Projects, Trashed Projects), and a 'TAGS/FOLDERS' section with a 'New Folder' button. Below this is a section for institutional affiliation. The main content area features a search bar and a table of projects.

<input type="checkbox"/> Title	Owner	Last Modified ▾	Actions
<input type="checkbox"/> First Latex Project	You	12 minutes ago by You	
<input type="checkbox"/> Electronic_Imaging_2019	kashif.ahmad	3 months ago by kashif.ahmad	
<input type="checkbox"/> Preparation of Papers for IEEE ACCESS (2)	kashif.ahmad	3 months ago by kashif.ahmad	
<input type="checkbox"/> Active_learning_Naina	kashif.ahmad	5 months ago by You	
<input type="checkbox"/> Flood Prediction Using AI-A survey	You	7 months ago by You	
<input type="checkbox"/> mediaeval-2018-satellite	michael riegler	7 months ago by kashif.ahmad	
<input type="checkbox"/> Conference-LaTeX-template_7-9-18 (1)	You	10 months ago	
<input type="checkbox"/> Project Proposal Template (2)	You	a year ago by You	

Creating a project in Overleaf

Select New Project > Blank Project > Give it a name > Create

The screenshot displays the Overleaf web interface. A 'New Project' dialog box is open in the center, featuring a text input field with the text 'First Latex Project' and two buttons: 'Cancel' and 'Create'. The background shows the 'All Projects' section with a list of projects. The left sidebar contains navigation options like 'New Project', 'Your Projects', 'Shared with you', 'Archived Projects', and 'Trashed Projects'. The top right corner has links for 'Help', 'Projects', and 'Account'.

Title	Owner	Last Modified	Actions
<input type="checkbox"/> Title			
<input type="checkbox"/> First Latex Project		12 minutes ago by You	
<input type="checkbox"/> Electronic_Imaging_2019	kashif.ahmad	3 months ago by kashif.ahmad	
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<input type="checkbox"/> Project Proposal Template (2)	You	a year ago by You	

Writing your first piece of LaTeX

```
\documentclass{article}
```

```
\begin{document}
```

This is our first LaTeX document for technical writing class.

```
\end{document}
```

This is our first LaTeX document for technical writing class.

Understanding the first piece of Latex

- Class declares the type of the document.
 - Controls the overall appearance of the document.
 - Different types of documents will require different classes i.e. a CV/resume will require a different class than a scientific paper.
 - In this case, the class is article, the simplest and most common LaTeX class.
 - **Report** or **book** are some other type of classes.
- The content of our document is enclosed inside the `\begin{document}` and `\end{document}` tags.
- This is known as the body of the document.

The preamble of a document

- Everything in your .tex file before the `\begin{document}` tag is called the preamble.
- In the preamble you define
 - The type of document you are writing.
 - The packages you would like to use.
 - Several other elements.
- Example shows LaTeX document of font size 12 (default 10), paper size letterpaper and encoding utf8.

```
\documentclass[12pt, letterpaper]{article}  
\usepackage[utf8]{inputenc}
```

Adding Author, Date and Title

```
\documentclass[12pt, letterpaper, twoside]{article}  
\usepackage[utf8]{inputenc}
```

```
\title{Enter Document Name Here}  
\author{Enter Author Name Here}  
\date{Enter Date Here}  
\begin{document}
```

```
\maketitle
```

We have now added a title, author and date to our LaTeX document!

```
\end{document}
```

Adding Comments

```
\begin{document}
```

```
\maketitle
```

We have now added a title, author and date to our first Latex document!

% This line here is a comment. It will not be printed in the document.

```
\end{document}
```

Bold, Italics and Underline

```
\begin{document}
```

```
\maketitle
```

```
Some of the \textbf{greatest}  
discoveries in \underline{science}  
were made by \textbf{\textit{accident}}.
```

```
\end{document}
```

Adding Images

```
\documentclass{article}  
\usepackage{graphicx}  
\graphicspath{ {images/} }
```

```
\begin{document}
```

The universe is immense and it seems to be homogeneous,
in a large scale, everywhere we look at.

```
\includegraphics{universe}
```

Here is picture of a cat.

```
\end{document}
```


Captions, labels and references

```
\documentclass{article}
\usepackage{graphicx}
\graphicspath{ {images/} }

\begin{document}
\begin{figure}[h]
  \centering
  \includegraphics[width=0.25\textwidth]{mesh}
  \caption{a nice plot}
  \label{fig:mesh1}
\end{figure}
```

As you can see in the figure \ref{fig:mesh1}, the function grows near 0. Also, in the page \pageref{fig:mesh1} is the same example.

```
\end{document}
```

Unordered List

```
\begin{itemize}  
  \item The individual entries are indicated with a black dot, a so-  
called bullet.  
  \item The text in the entries may be of any length.  
\end{itemize}
```

Ordered List

```
\begin{enumerate}  
  \item This is the first entry in our list  
  \item The list numbers increase with each entry we add  
\end{enumerate}
```

Adding Math to Latex

Inline

In physics, the mass-energy equivalence is stated by the equation $E=mc^2$, discovered in 1905 by Albert Einstein.

Displayed

The mass-energy equivalence is described by the famous equation
$$E=mc^2$$

discovered in 1905 by Albert Einstein.
In natural units ($c = 1$), the formula expresses the identity
$$E=m$$

Sections

```
\documentclass{article}
\begin{document}
This is our first LaTeX document for technical writing class.
\section{Introduction}
\section{Background}
\section{Literature Review}
\end{document}
```

Subsections

```
\documentclass{article}
\begin{document}
This is our first LaTeX document for technical writing class.
\section{Introduction}
\section{Background}
\section{Literature Review}
\subsection{Subsection 1 of Lit Review}
\subsection{Subsection 2 of Lit Review}
\end{document}
```

Latex : Endless Possibilities

- There are endless things you can do with LaTeX.
- Explore more on the official site of overleaf : <https://www.overleaf.com/>

Assignment

- Write the Abstract and Literature Review part of your MSc proposal in LaTeX.
- **Submission deadline. Two weeks starting from today.**