

# How to Install and Use LaTeX

## Overleaf vs Local Setup

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## Purpose

This document defines two approved workflows for writing and compiling LaTeX documents:

- Directly on Overleaf (cloud-based)
- Locally on a personal machine (MacTeX + VSCode)

It specifies when to use each option, along with their advantages and limitations.

## Option A: Overleaf (Cloud-Based LaTeX)

### Overview

Overleaf is a browser-based LaTeX editor that requires no local installation and supports real-time collaboration.

### Procedure

1. Go to <https://www.overleaf.com>
2. Create a new project (blank or template)
3. Edit `.tex` files directly in the browser
4. Click **Recompile** to generate the PDF

### Pros

- Very easy to use (no setup required)
- Real-time collaboration and commenting
- Automatic package management
- Ideal for quick drafts and shared documents

### Cons

- Compile time limits (especially on free tier)
- Can become slow or unstable near major conference deadlines
- Limited control over compiler versions and system tools
- Less suitable for large projects with many figures or custom scripts

### Operational Risk

During peak academic deadlines (e.g., conference submissions), Overleaf servers may experience latency or failed compiles.

## Option B: Local LaTeX (MacTeX + VSCode)

### Overview

Local compilation uses a full LaTeX distribution installed on your machine, typically with VSCode and LaTeX Workshop.

### Procedure

1. Install MacTeX from <https://www.tug.org/mactex/>
2. Install VSCode and the **LaTeX Workshop** extension
3. Open the project folder locally
4. Compile using `latexmk`, `pdflatex`, or `xelatex`

### Local Installation (macOS) — Command Line Alternatives

Alternatively, if you prefer not to install via the graphical .dmg installer, the following command-line approaches are common.

#### Option 1: Install via Homebrew (recommended for CLI users)

##### MacTeX (full distribution, large download):

```
brew update
brew install --cask mactex

# Verify
latex --version
pdflatex --version
latexmk -v
```

##### MacTeX no-GUI variant (still TeX Live, smaller than full MacTeX):

```
brew update
brew install --cask mactex-no-gui
```

##### BasicTeX (minimal TeX Live; install packages as needed):

```
brew update
brew install --cask basictex

# BasicTeX usually requires installing missing LaTeX packages via tlmgr
sudo tlmgr update --self
```

## Option 2: Install from a downloaded installer using installer

This is useful for offline installs or when you already have the installer locally.

If you have a .pkg file:

```
# Example: install a local PKG  
sudo installer -pkg /path/to/MacTeX.pkg -target /
```

If you have a .dmg but want a fully CLI flow (no GUI):

```
# Mount the DMG  
hdiutil attach /path/to/MacTeX-*.dmg  
  
# Find the PKG inside the mounted volume  
ls /Volumes  
ls "/Volumes/MacTeX-*"  
  
# Install the PKG (path may vary by release)  
sudo installer -pkg "/Volumes/MacTeX-*/MacTeX.pkg" -target /  
  
# Unmount when done  
hdiutil detach "/Volumes/MacTeX-*"
```

## Post-Install Checks (macOS)

1. Confirm TeX binaries are on your PATH:

```
which pdflatex  
which latexmk
```

2. If commands are not found, macOS typically uses `/Library/TeX/texbin`. You can add it to your shell configuration (`/.zshrc`):

```
export PATH="/Library/TeX/texbin:$PATH"
```

3. (Optional) Update TeX Live packages (may take time and requires admin privileges in some setups):

```
sudo tlmgr update --self  
sudo tlmgr update --all
```

## Pros

- Highly reliable and robust
- No compile time or project size limits
- Full control over compiler, packages, and build process
- Suitable for large documents, heavy figures, and automation

## Cons

- Initial setup is more complicated
- Debugging LaTeX errors requires more familiarity

- Requires manual package management

#### Best Practice

Local compilation is strongly recommended for final submissions, large projects, and deadline-critical work.

## Recommendation Summary

- Use **Overleaf** for early drafts, collaboration, and lightweight documents.
- Use **Local LaTeX** for serious writing, large projects, and final submissions.