

Setting up LaTeX with VS Code

A step-by-step installation guide for Windows and macOS

WHAT YOU'LL BUILD

By the end of this guide, you'll have a fully working local LaTeX environment — no Overleaf, no internet connection required to compile. You'll be able to write `.tex` files in VS Code, press a button, and see a PDF appear right next to your source.

Contents

1. What we're installing (and why)
2. Part A — Install a LaTeX distribution
3. Part B — Install Visual Studio Code
4. Part C — Install the LaTeX Workshop extension
5. Part D — Test your setup with a sample document
6. Troubleshooting common problems

1. What we're installing and why

LaTeX isn't a program — it's a *typesetting system*. To write LaTeX documents comfortably on your computer, you need three pieces working together:

- **A LaTeX distribution** — the engine that turns `.tex` source files into PDFs. We'll use **MiKTeX** on Windows and **MacTeX** on macOS.
- **A text editor** — where you actually type your document. We'll use **Visual Studio Code** (VS Code), which is free, fast, and widely used.
- **The LaTeX Workshop extension** — a plugin that connects VS Code to the LaTeX engine, giving you one-click compilation, live preview, auto-completion, and error highlighting.

Note: Technically, you could type your document in any text editor (Notepad, RStudio/Positron, or even MS Word), save it as a `.tex`, and then compile it using the terminal. But it is just much more useful to have an editor where it's easier to write and that can also compile it (which is what VS Code + Latex extension does).

IMPORTANT: Order matters

Always install the LaTeX distribution *first*, then VS Code, then the extension. The extension looks for an existing LaTeX installation when you use it for the first time, so it has to be in place first.

2. Part A — Install a LaTeX distribution

Windows For Windows users:

Install MiKTeX

Step 1 Download the installer

Open your web browser and go to miktex.org/download. Click the big **Download** button under "Windows". You'll get a file called something like `basic-miktex-XX.X-x64.exe`.

Step 2 Run the installer

Double-click the downloaded file. If Windows asks "Do you want to allow this app to make changes?", click **Yes**.

Accept the license terms and click **Next**.

Step 3 Choose installation options

- When asked "*Install MiKTeX for...*" → choose "**Only for me**" (simpler, doesn't need admin rights later).
- Leave the default install location as-is.
- Paper size: **A4** (European standard).
- **Important:** For "Install missing packages on-the-fly", choose "**Yes**". This tells MiKTeX to download extra packages automatically whenever a document needs them — you won't have to think about it.

Click **Start**. The installation takes 5–10 minutes.

Step 4 Finish and update

When it's done, click **Close**. Then open the Start Menu, search for "**MiKTeX Console**", and launch it. Click on the **Updates** tab on the left, then **Check for updates**, and if any are listed, click **Update now**. This ensures your installation is current.

Note: The first time you compile a document, MiKTeX may pop up windows asking permission to download missing packages. Click **Install** each time. After a few compilations, the most common packages will be cached and the prompts will stop.

For macOS users:

Install MacTeX

Step 1 Download the installer

Open your web browser and go to tug.org/mactex. Click the **MacTeX.pkg** download link near the top of the page.

The file is roughly **5 GB**, so the download can take a while depending on your connection. This is normal — MacTeX bundles everything you'll ever need.

Step 2 Run the installer

Once downloaded, double-click **MacTeX.pkg** in your Downloads folder. The macOS installer will open.

Click **Continue** through the introduction, license, and destination screens. Accept the license. When you reach "Installation Type", click **Install**.

Enter your Mac password when prompted. Installation will take 5–10 minutes.

Step 3 Verify the installation

Open the **Terminal** app (press `Cmd + Space`, type "Terminal", press Enter). Type:

```
pdflatex --version
```

Press Enter. If you see something like `pdfTeX 3.141592...` followed by version details, it worked. If you see "command not found", close and reopen the Terminal and try again (macOS needs a fresh shell to pick up the new tools).

3. Part B — Install Visual Studio Code (same steps Windows/macOS)

Step 1 Download VS Code

Go to code.visualstudio.com. The site detects your operating system automatically — click the big blue download button.

Step 2 Install it

Windows Run the downloaded `.exe`. Accept the defaults on every screen, but make sure the box "Add to PATH" is ticked (it is, by default). Click **Install**.

macOS Open the downloaded `.zip`. Drag the **Visual Studio Code** app into your **Applications** folder. That's it.

Step 3 Launch VS Code

Open it from the Start Menu (Windows) or Launchpad / Applications (macOS). You'll see a welcome screen — you can close it.

4. Part C — Install the LaTeX Workshop extension

Step 1 Open the Extensions panel

On the left edge of VS Code there's a vertical strip of icons called the Activity Bar. Click the icon that looks like **four squares** (the bottom-right square detached). Alternatively, press `Ctrl + Shift + X` on Windows, or `Cmd + Shift + X` on macOS.

Step 2 Search and install

In the search box at the top, type `LaTeX Workshop`. The first result — by **James Yu** — is the one you want (it should have millions of downloads). Click the blue **Install** button.

Installation takes a few seconds. You'll see a small confirmation.

Step 3 Restart VS Code

Quit VS Code completely and reopen it. This ensures the extension loads correctly and can detect your LaTeX installation.

WHAT YOU JUST GAINED

LaTeX Workshop adds a new icon to the Activity Bar (shaped like the LaTeX lion "TeX"). It gives you: one-click compilation, live PDF preview, syntax highlighting, auto-completion of commands, error messages that point to the right line, and inverse search (click a spot in the PDF to jump to the source).

5. Part D — Test your setup with a sample document

Let's make sure everything works by compiling a small document.

Step 1 Create a project folder

On your Desktop, create a new folder called `latex-test`. Put it somewhere with a simple path — **avoid folders whose names contain spaces, accents, or special characters**, as some LaTeX tools still handle these poorly.

Step 2 Open the folder in VS Code

In VS Code, go to **File → Open Folder...** (Windows) or **File → Open...** (macOS) and select your `latex-test` folder.

Step 3 Create a new file

Click **File → New File**, then immediately save it (Ctrl/Cmd + S) as `hello.tex` inside your `latex-test` folder. The `.tex` extension is important — it tells VS Code this is a LaTeX document.

Step 4 Paste this sample document

Copy the code below into your new `hello.tex` file and save it:

```
\documentclass[11pt,a4paper]{article}

\usepackage[utf8]{inputenc}
\usepackage[T1]{fontenc}
\usepackage{amsmath, amssymb}
\usepackage{graphicx}
\usepackage[margin=2.5cm]{geometry}

\title{My First LaTeX Document}
\author{Your Name Here}
\date{\today}

\begin{document}

\maketitle

\section{Introduction}
This is my first document written in \LaTeX.
If you can see this as a PDF, your setup works.

%% This is how to comment in Latex, anything after “%” does not show up
Because of that, you need to write \% if you want the percent sign

This is \textbf{bold} face and this it \textbf{italics}.

\section{A bit of mathematics}

LaTeX is excellent forequations. For example,
the quadratic formula is:
```

```
\begin{equation}
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\end{equation}
```

Or the equation of a Spatial Lag Model:

```
\begin{equation}
\mathbf{y} = \rho \mathbf{W}\mathbf{y} + \mathbf{X}\boldsymbol{\beta} +
\boldsymbol{\varepsilon}, \quad \boldsymbol{\varepsilon} \sim \mathcal{N}(\mathbf{0},
\sigma^2 \mathbf{I})
\end{equation}
```

```
\section{A simple list}
```

Bullet points:

```
\begin{itemize}
\item LaTeX is installed.
\item VS Code is installed.
\item The LaTeX Workshop extension is installed.
\end{itemize}

\end{document}
```

Step 5 Compile the document

Save the file again with `Ctrl/Cmd + S`. By default, LaTeX Workshop compiles automatically on save.

If it doesn't, click the small **green "play" triangle** at the top-right of the editor, or press `Ctrl/Cmd + Alt + B (Windows) / Cmd + Option + B (macOS)`.

Windows On the first compilation, MiKTeX will pop up windows asking to install packages like `inputenc`, `geometry`, etc. Click **Install** on each one. This only happens once.

Step 6 View the PDF

After 5–20 seconds, a `hello.pdf` file will appear in your folder. To preview it inside VS Code, click the **magnifying glass icon** at the top-right of the editor (or right-click in the file and choose **"View LaTeX PDF" → "View in VSCode tab"**). A side-by-side preview will open.

If you see a nicely formatted document with the quadratic formula and Euler's identity, you're done. Your local LaTeX setup works.

6. Troubleshooting common problems

Compilation silently does nothing

Check the **OUTPUT** panel at the bottom of VS Code. Click the dropdown on its right side and select "**LaTeX Workshop**" to see what's happening. Most issues show up there.

"Recipe terminated with error" or a red cross

Open the **PROBLEMS** tab at the bottom. LaTeX Workshop lists each error with a line number — click one to jump straight to the offending line. The most common causes are missing closing braces, a typo in a command name, or an un-escaped special character (`%`, `&`, `$`, `#`, `_`).

Windows MiKTeX keeps asking to install packages

This is expected for the first few documents. If you want to install everything up-front to avoid prompts, open **MiKTeX Console** → **Settings** and, under "You can choose whether missing packages are to be installed automatically", set it to "**Always install missing packages on-the-fly**".

macOS "pdflatex: command not found" in VS Code

Quit VS Code completely (`Cmd + Q`) and relaunch it from Launchpad. VS Code needs a restart to pick up the PATH changes MacTeX made. If the problem persists, open Terminal and run `echo $PATH`; you should see `/Library/TeX/texbin` in the output.

The PDF doesn't update when I save

Make sure you're saving the `.tex` file (not the PDF). Check the bottom status bar — if auto-build is off, the gear icon will show it. You can also trigger a build manually with the green "play" triangle.

Nothing renders — blank PDF or no PDF at all

Delete all auxiliary files (`.aux`, `.log`, `.out`, `.synctex.gz`) from your project folder and try compiling again from a clean slate. LaTeX Workshop has a built-in command for this: open the Command Palette (`Ctrl/Cmd + Shift + P`) and search for "**LaTeX Workshop: Clean up auxiliary files**".

I don't see the LaTeX Workshop icon in the sidebar

Open any `.tex` file first — the extension's icon only appears once VS Code recognizes you're working with LaTeX.

WHEN IN DOUBT

The two most effective first-aid steps are: (1) **fully restart VS Code**, and (2) **delete the auxiliary files** and recompile. Roughly 80% of weird issues resolve with one of those.