

CHEM30320: Chemical Thermodynamics and Physical Transformations

Getting Started with Julia

I've prepared notes for the statistical mechanics (stat. mech.) section of CHEM30320 in the form of [Pluto.jl](#) notebooks. Pluto.jl is a framework for interactive, web-based programming using the [Julia](#) programming language. Here, I'll provide necessary resources for installing Julia, using Julia in the command-line and through VSCode/VSCodium, installing Pluto.jl, and using/interacting with Pluto notebooks.

If you read this document and follow the links to various instruction manuals, how-to guides, and tutorial videos, you **should** be able to access and play around with the course notes. If you're having trouble or want to know more, please **reach out to me** and/or **come to my office hours**.

NOTE: You do not by any means have to use the Pluto.jl notebooks that I've provided. Each week, I will upload slides which provide all of the essential material that we'll be covering. I will also release static, [Quarto](#)-based notes on my [personal website](#) (see <https://ewcss.info/teaching/26/chem30320>). However, there will be a continuous assessment for the stat. mech. portion that requires the use of Julia, so it's not a bad idea to try things out before then.

1 Installing Julia

You can install Julia through the [command-line](#) or by [manual installation](#). For Windows users, I recommend the manual installation route. Be sure to download the 64-bit version, **not** the 32-bit version, and it'll be helpful if, when you're going through the installer, you add Julia to PATH.

For further platform-specific guidance, see [here](#). For video-based tutorials for installing Julia, try these resources:

- [Windows](#)
- [Mac](#) (note: this tutorial also goes into installing VSCode; see below)

2 Using Julia in the Command-Line

Depending on your platform (*i.e.*, if you're using Windows, Mac, Linux, or some other operating system), how you access Julia might vary. If you don't want to deal with figuring out a command-line interface, you can skip this section and move on to step 3 "Installing VSCode/VSCodium".

For Mac and *nix users, you can open the application "Terminal". For Windows users, you should be able to open the built-in PowerShell or [the Windows Terminal](#). In any case, if Julia has been installed properly, you should just be able to type `julia`, press <enter>, and see the Julia read-evaluate-print-loop (REPL) interface (see [here](#)).

You're not expected to learn to code in Julia for this class (though, if you want to learn, I provide some resources below). But it will be helpful if you're at least comfortable with the very basics of using Julia, including through the REPL. You can find some tutorials [here](#), [here](#), [here](#).

3 Installing VSCode/VSCodium

[Visual Studio Code](#) (VSCode) is a popular text editor and integrated development environment (IDE). It is the preferred IDE for writing Julia code.

Rather than using VSCode itself, I will recommend that you use [VSCodium](#), a free and open-source release of VSCode. VSCodium includes all of the core features of VSCode, but without Microsoft's tracking software. VSCodium is also less aggressive about pushing "artificial intelligence" on users.

Instructions on how to download VSCodium can be found [here](#). If you want to use VSCode, you can download it [here](#) (some additional documentation can be found [here](#)).

You can find video tutorials, see:

- [Windows](#) (VSCodium)
- [Windows](#) (VSCode)
- [Mac](#) (VSCode)

4 Julia in VSCodium/VSCode

Once you have both Julia and VSCodium/VSCode installed, you'll probably want to be able to use Julia in your IDE (that was sort of the point of installing an IDE, after all!).

Thankfully, integrating Julia in VSCodium/VSCode is very straightforward. You just need to install the Julia extension (instructions can be found [here](#) or [here](#)) and make sure that the extension is set up to point to your Julia installation (see "Configuring the Julia extension" [here](#)).

Once the extension is installed and properly set up, you can use it in a couple of different ways (see [here](#)). You can open up a REPL within VSCodium/VSCode, using it basically as you did in Section 2 above. You can also execute Julia code that you write in VSCodium/VSCode's text editor.

Video tutorials to using Julia in VSCode can be found [here](#) or [here](#).

5 Installing Pluto.jl

Okay, so now, you have Julia, you have VSCodium/VSCode, and the two can work together. The last thing that you need to mess with Pluto.jl notebooks is, well, Pluto.jl.

To install:

1. Enter a Julia REPL
2. Add Pluto
 - Option 1: via package (Pkg) mode
 1. Press `]` to enter the Pkg mode
 2. Type `add Pluto` and press `<enter>`
 3. Press `<backspace>` to exit Pkg mode
 - Option 2: via the main mode
 1. `import Pkg` to gain access to the package installation (Pkg) interface
 2. `Pkg.add("Pluto")` to install Pluto.jl
3. Confirm your installation works by running `import Pluto`. If there are no errors, congrats! It's been installed properly.

I'll note in passing that it's possible to run Pluto notebooks in the cloud (see "Use Pluto in the cloud" [here](#)). I've never used any of these tools, so I don't know how easy they are to use, but it could be a good option if you don't want to install on your local system or if you run into problems!

6 Using Pluto.jl notebooks

The basic recipe to launching Pluto notebooks is:

1. Enter a Julia REPL
2. Import Pluto.jl with `import Pluto`
3. Run `Pluto.run()`

If everything is configured properly, this will launch a web browser tab with the Pluto.jl interface. From there, you can create a new notebook or open an existing notebook. Some guides to

doing just that are provided [here](#), [here](#), and [here](#). The Pluto.jl developers also have some great [documentation](#) and a collection of [example notebooks](#) that might help you out.

7 Additional Learning Resources

For a real crash course into Julia, you can check out the [Julia page](#) for “Learn X in Y minutes”

Some books that I’ve found helpful:

- [Practical Julia: A Hands-On Introduction for Scientific Minds](#) by Lee Phillips (if you need help accessing this book, reach out; I can help!)
- [Romeo and Julia, where Romeo is Basic Statistics](#) by Bartłomiej Lukaszuk

There are several free Julia courses listed on the main [Julia website](#). [Julia Programming for Nervous Beginners](#) is a good place to start if you’re coming in with no or very little programming experience.

If you have used another programming language before (say, Python) and want to know what makes Julia different and special, you can check out [this handy comparison](#).