AI and Biotechnology/Bioinformatics

R Crash Course (2025)

Session 1: Getting Started with R

Welcome to your first session of the R Programming Crash Course!

In this session we'll setting up the gear you need to start coding in R, from installation of software to organizing the R workspace.

Learning Outcomes!

By the end of this session, you'll learn how to

- Install R, RStudio and RTools.
- Get and set up a working directory.
- Create your first R project in RStudio.

Let's get started!

R is a free open-source programming language, widely used in statistical, machine learning & bioinformatics analysis.

R provides a wide range of built-in functions for data manipulation, statistical analysis, machine learning modelling and visualization.

It has a large community and thousands of packages that are available through CRAN (Comprehensive R Archive Network) and Bioconductor (especially useful for bioinformatics, genomics and transcriptomic analysis).

Think of it as a scientific lab, where you have all the equipment and reagents for your experiment.

RStudio is a tool that makes working with R easier; it's an Integrated Development Environment (IDE) that provides a user-friendly interface to write codes, visualize data and manage projects.

Think of it as your workbench, where you organize and carry out your work.

💡 Important: RStudio requires R to function, so we need to install R first. But you can work with R without RStudio.

RTools is needed to build and install certain R packages that contain compiled code. This helps you to install dependencies that are built out of CRAN sources or packages from GitHub (for Windows users only).

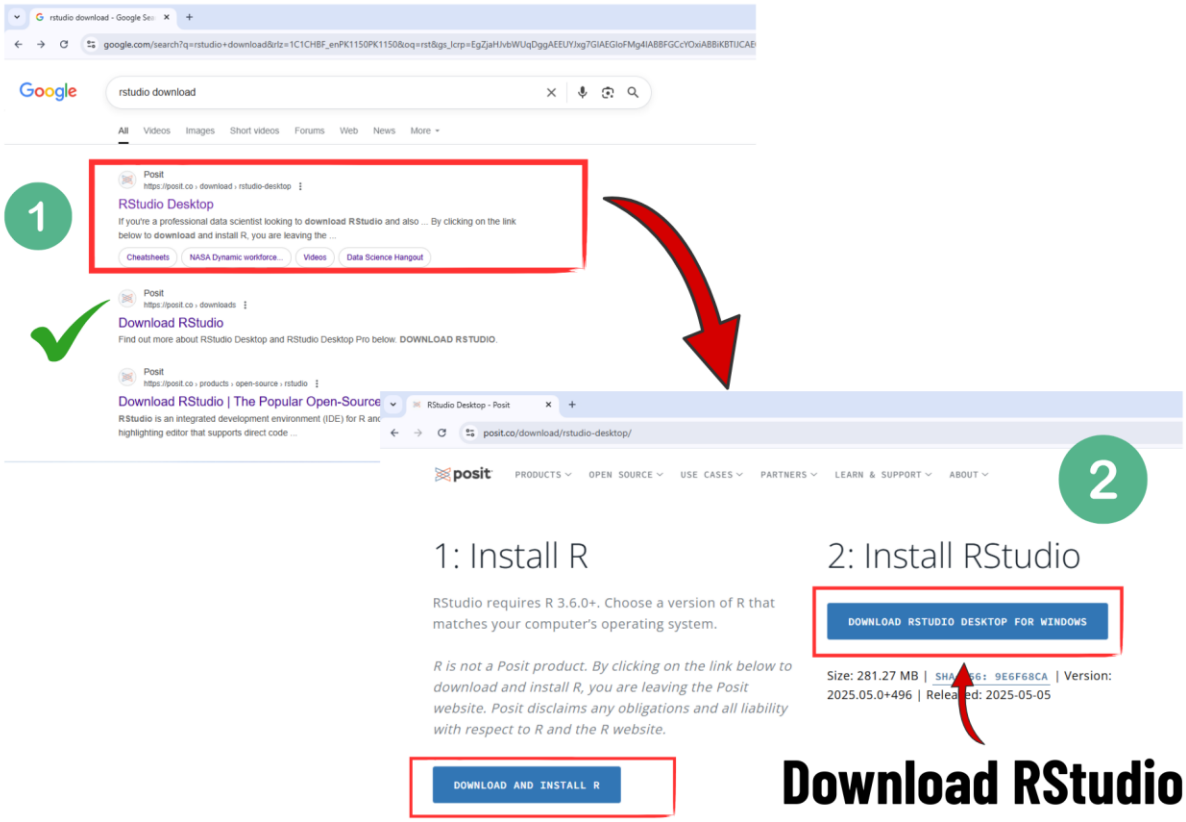
How to Download and Install?

Open your browser and search for **“RStudio Download”**. Click on the first link, **“RStudio Desktop”**, that should be from posit.co.

(If you don’t see it at the top, scroll down and search for **“RStudio Download”** from the same posit.co domain. You can download it from there as well.

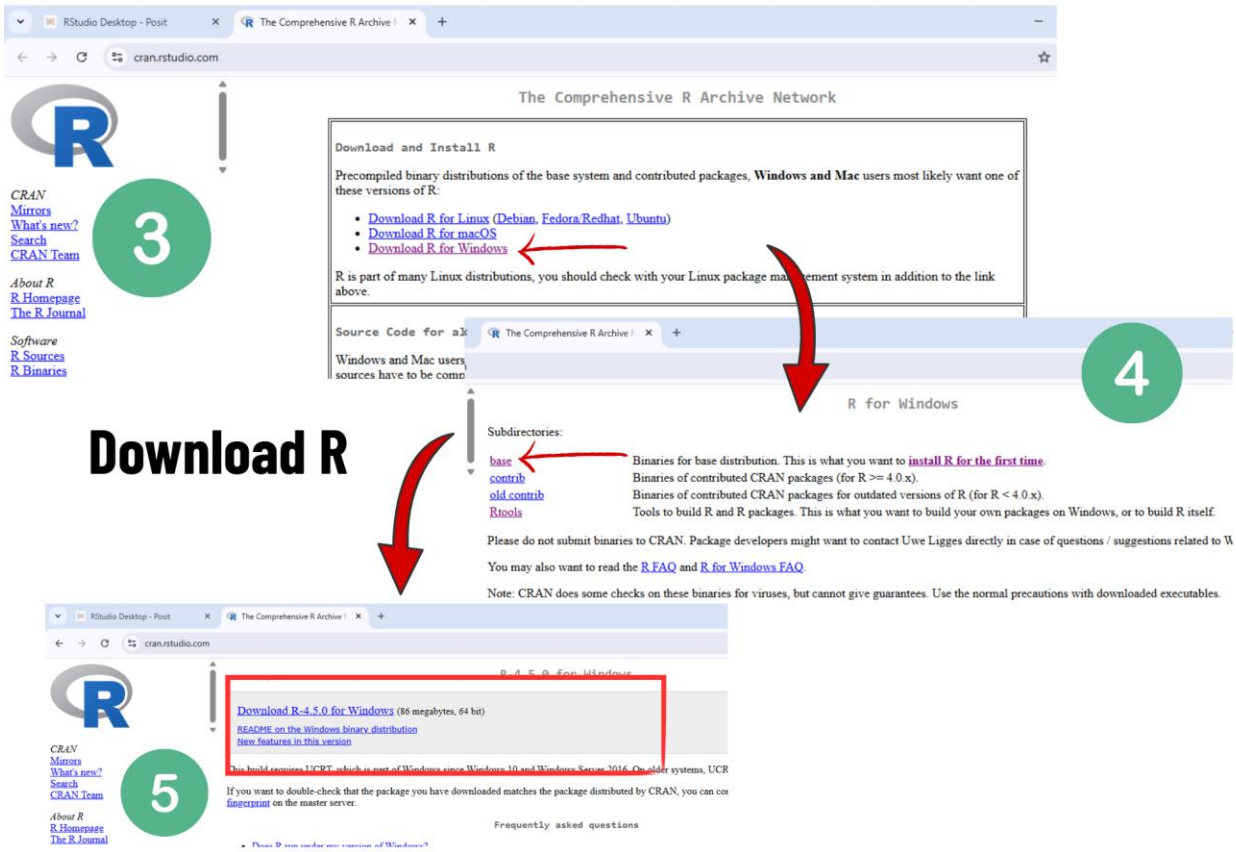
This link will take you to the official RStudio download page. If you scroll down to the page, you’ll see two steps:

- **Step 1 is “Install R”**
- **Step 2 is Install RStudio.**

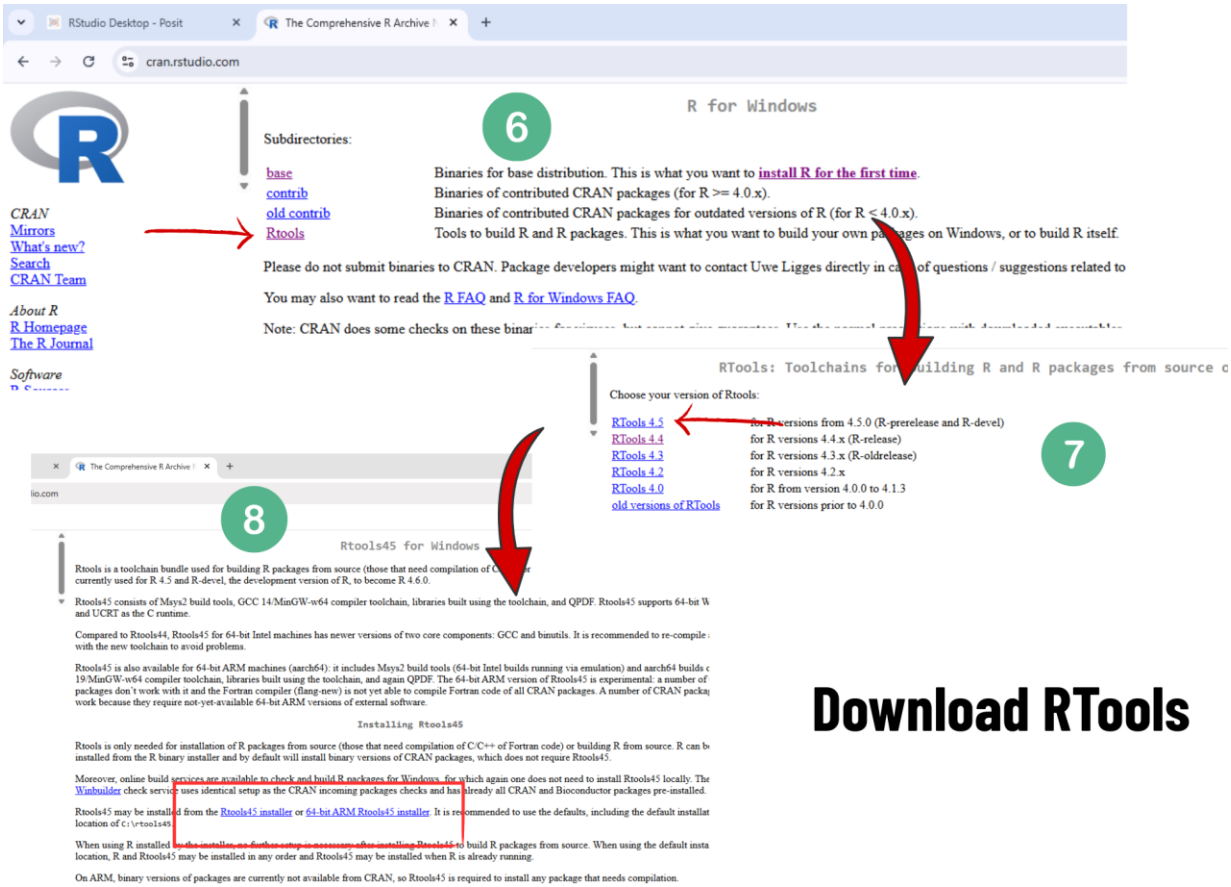


➢ To download RStudio, click on **“Download RStudio Desktop for Windows”** download will start automatically

- To Download R; click on **“Download and Install R”**. This will take you official CRAN page. Here you’ll see different download options for Linux, macOS and Windows. Since we are installing it for Windows, click on **“Download R for Windows”.**
  On the next page, click **“base”** or **“Install R for the first time”**. This will show you the latest version of R on another page. Click on it; the download will start right away.



- To download RTools, go back to the previous page where we clicked “base”; at this time select **“RTools”**.
  You’ll see a different RTools version on a new page. Make sure to select the one that matches your R version. At this time, we’re installing R version 4.5.0, so download RTools 4.5. Click on the correct version; it will take you to another page. On this page, look for **“Rtools45 installer”**; click on it the download will begin.



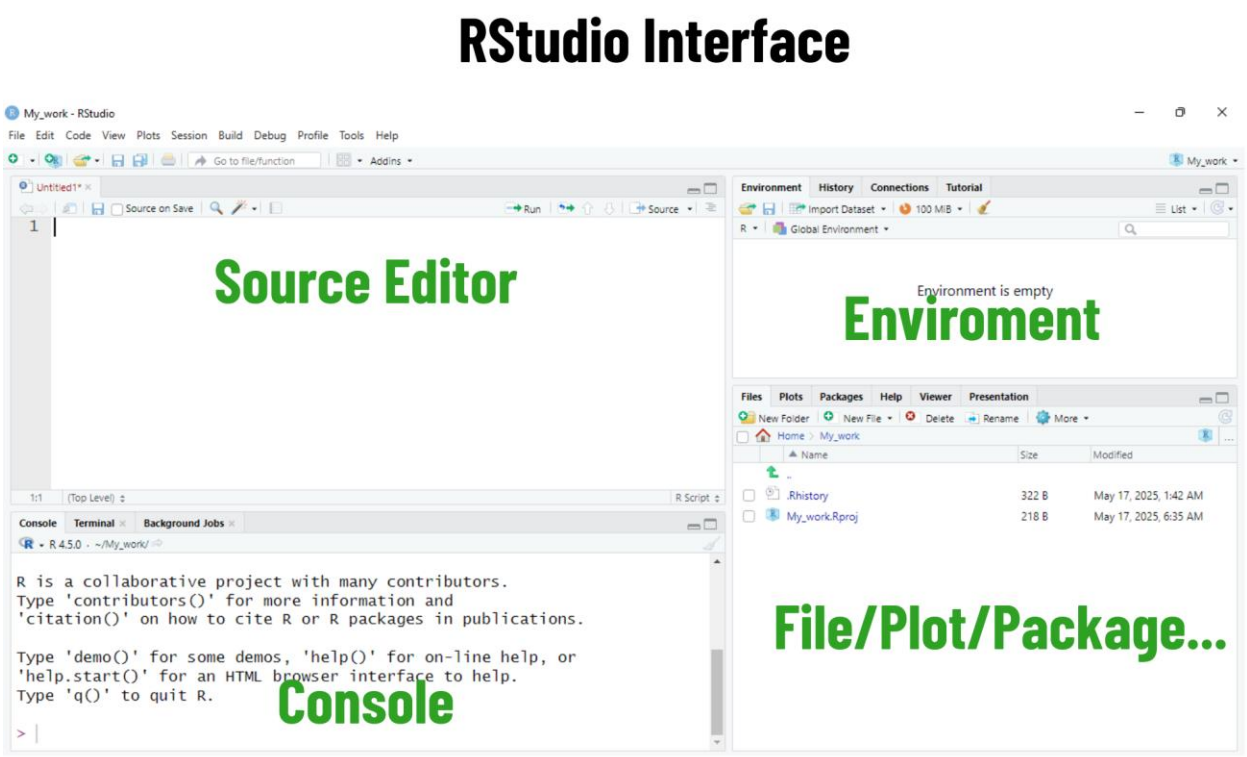
Once all the downloads are finished, install R, RStudio and RTools one by one, keep everything on default and follow the installation steps.

RStudio Interface

After installation, find RStudio in the Start menu and open it.

You'll see 4 panels there:

- **Top Left (Source Editor):** Where you can write and save your scripts (codes)
- **Bottom Left (Console):** Where codes actually run and output appears. You can also write codes in the console, but it will disappear on a new session, so it's a good practice to write your code in the source editor.
- **Top Right (Environment/History):** This section stores R objects (variables, functions, output) and command history.
- **Bottom Right (Files/Plots/packages…):** This pane is for file management, plot visualizations and documentation.



Set Up a Working Directory

The working directory is basically a folder on your local system where R looks for files and saves output (results, files, and R scripts).

To check what your current working directory is, run the command.

getwd()

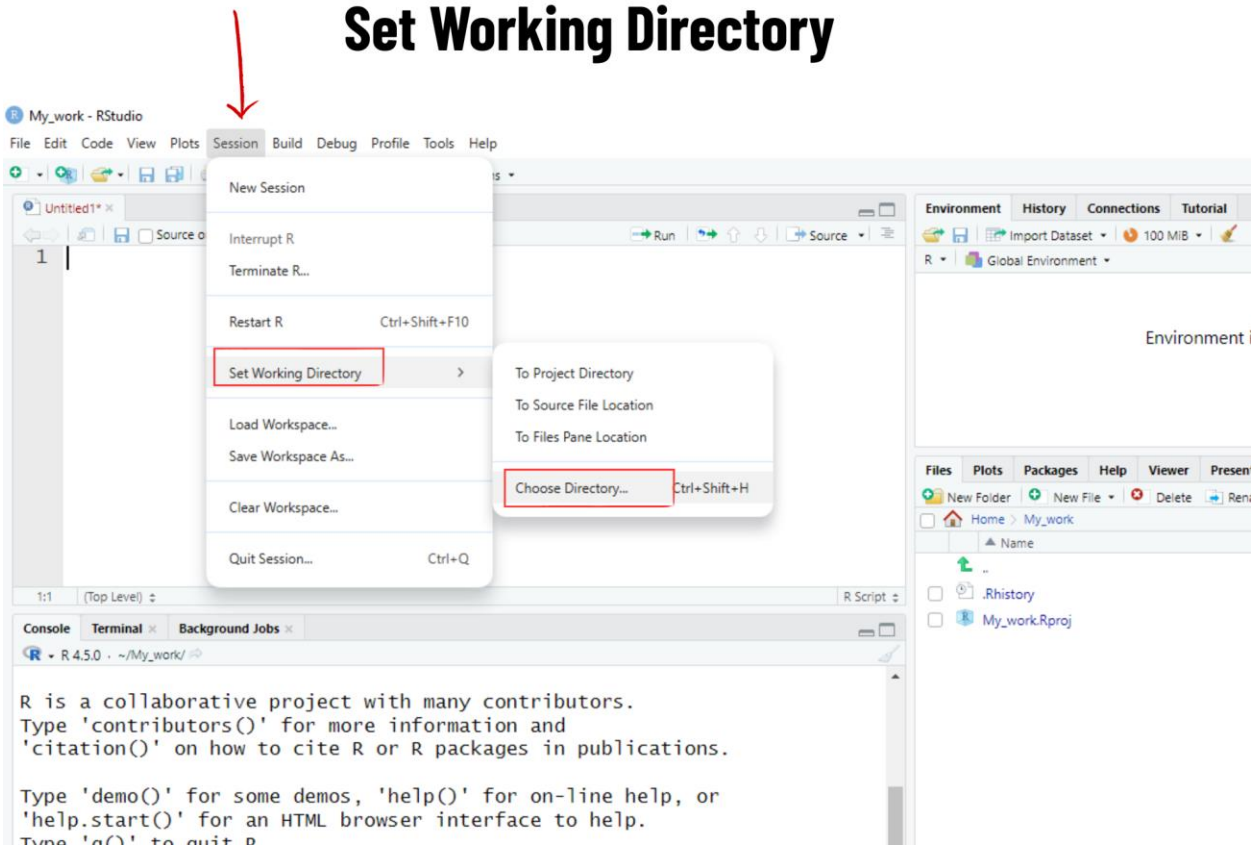
To set up a new working directory, use a command.

setwd(folder path)

e.g., setwd("c:/Users/Documents")

OR

Session > Set Working Directory > Choose Directory > Select Directory (folder) > Ok



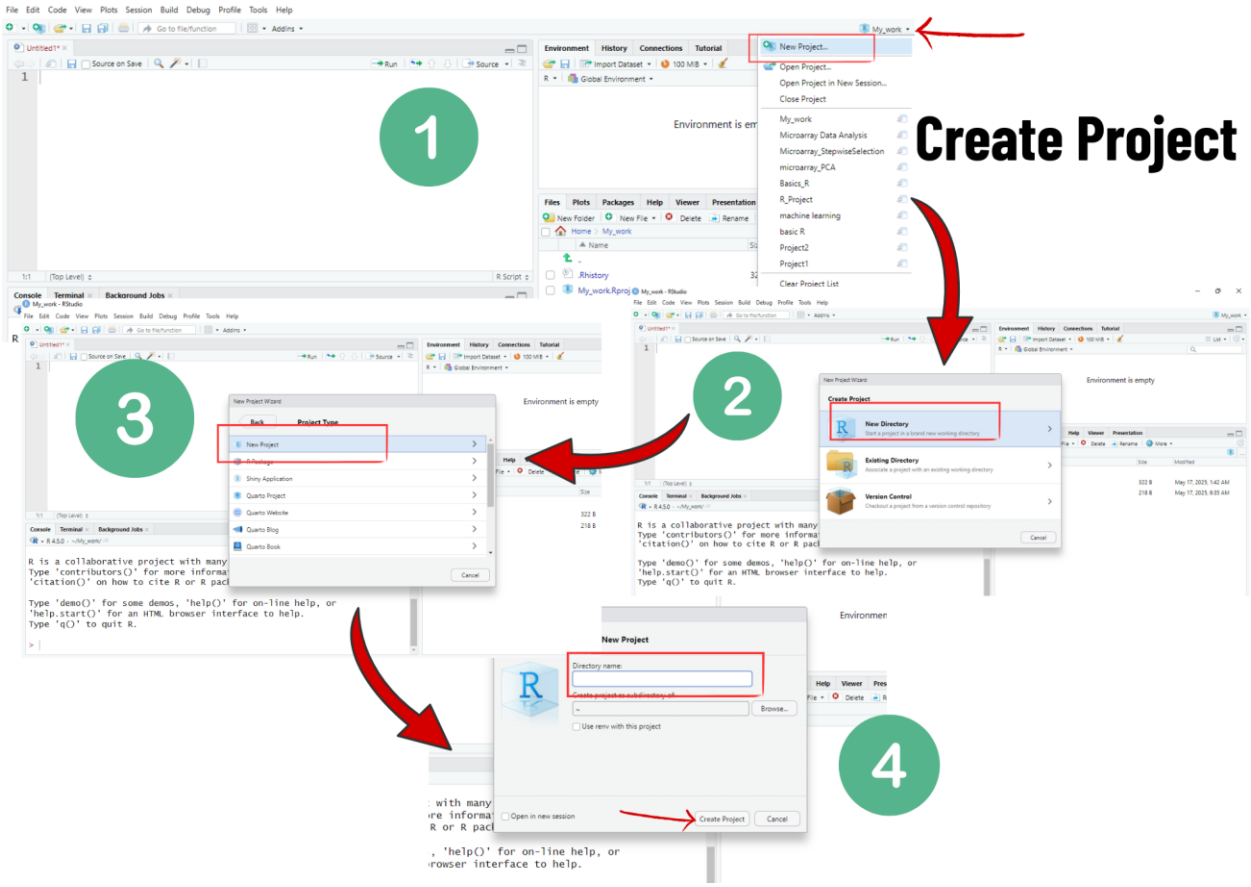
Working without setting up a directory is the same as working in a lab without a designated bench. Everything scattered, and it becomes hard to keep track of your data, scripts and results. But when you set a working directory, all stays in one place, and you can work effortlessly.

Create Project

Instead of setting up a working directory every time, it's better to create a project. It helps keep everything organized and makes it easy to switch between different tasks or datasets.

To create a project

- Go to project > New Project
- New Directory > New Project
- Enter the name and select the location.
- Click Create Project.



In your project you can manage your scripts, datasets and outputs within that folder and can locate any time you need.

That's all for today you:

- Installed R, RStudio and RTools.
- Set your working directory.
- Created your first project.

Now you're ready to work with R.

Watch step by step tutorial here: https://youtu.be/hRwhbnGCFKM