

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.**

1

Posit
https://posit.co/download/rstudio-desktop/

RStudio Desktop
If you're a professional data scientist looking to download RStudio and also ... By clicking on the link below to download and install R, you are leaving the ...

Cheatsheets NASA Dynamic workflow Videos Data Science Hangout

Download RStudio
Find out more about RStudio Desktop and RStudio Desktop Pro below. **DOWNLOAD RSTUDIO.**

Download RStudio | The Popular Open-Source
RStudio is an integrated development environment (IDE) for R and highlighting editor that supports direct code ...

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2

1: Install R

RStudio requires R 3.6.0+. Choose a version of R that matches your computer's operating system.

R is not a Posit product. By clicking on the link below to download and install R, you are leaving the Posit website. Posit disclaims any obligations and all liability with respect to R and the R website.

DOWNLOAD AND INSTALL R

2: Install RStudio

DOWNLOAD RSTUDIO DESKTOP FOR WINDOWS

Size: 281.27 MB | SHA256: 9E6F68CA | Version: 2025.05.0+496 | Released: 2025-05-05

Download 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.

Download R

3

The Comprehensive R Archive Network

Download and Install R

Precompiled binary distributions of the base system and contributed packages, **Windows and Mac** users most likely want one of these versions of R:

- [Download R for Linux \(Debian, Fedora/Redhat, Ubuntu\)](#)
- [Download R for macOS](#)
- [Download R for Windows](#)

R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

Source Code for all R packages: [The Comprehensive R Archive](#)

Windows and Mac users, sources have to be compiled.

4

R for Windows

Subdirectories:

- [base](#): Binaries for base distribution. This is what you want to **install R for the first time**.
- [contrib](#): Binaries of contributed CRAN packages (for R >= 4.0.x).
- [old-contrib](#): Binaries of contributed CRAN packages for outdated versions of R (for R < 4.0.x).
- [Rtools](#): Tools to build R and R packages. This is what you want to build your own packages on Windows, or to build R itself.

Please do not submit binaries to CRAN. Package developers might want to contact Uwe Ligges directly in case of questions / suggestions related to Windows.

You may also want to read the [R FAQ](#) and [R for Windows FAQ](#).

Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables.

5

R-4.5.0 for Windows

[Download R-4.5.0 for Windows](#) (86 megabytes, 64 bit)

[README on the Windows binary distribution](#)

[New features in this version](#)

This build requires UCRT, which is part of Windows since Windows 10 and Windows Server 2016. On older systems, UCR

If you want to double-check that the package you have downloaded matches the package distributed by CRAN, you can use [fingerpoint](#) on the master server.

Frequently asked questions

• [Please @ me under any version of Windows?](#)

- 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.

The image is a composite of three screenshots from the CRAN website, illustrating the steps to download RTools. Red arrows and green circles (6, 7, 8) indicate the sequence of actions.

Step 6: The first screenshot shows the CRAN website with the "base" subdirectory selected. The "RTools" link is highlighted.

Step 7: The second screenshot shows the "RTools: Toolchains for building R and R packages from source" page. The "RTools 4.5" link is highlighted.

Step 8: The third screenshot shows the "Rtools45 for Windows" page. The "Rtools45 installer" link is highlighted.

Download RTools

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

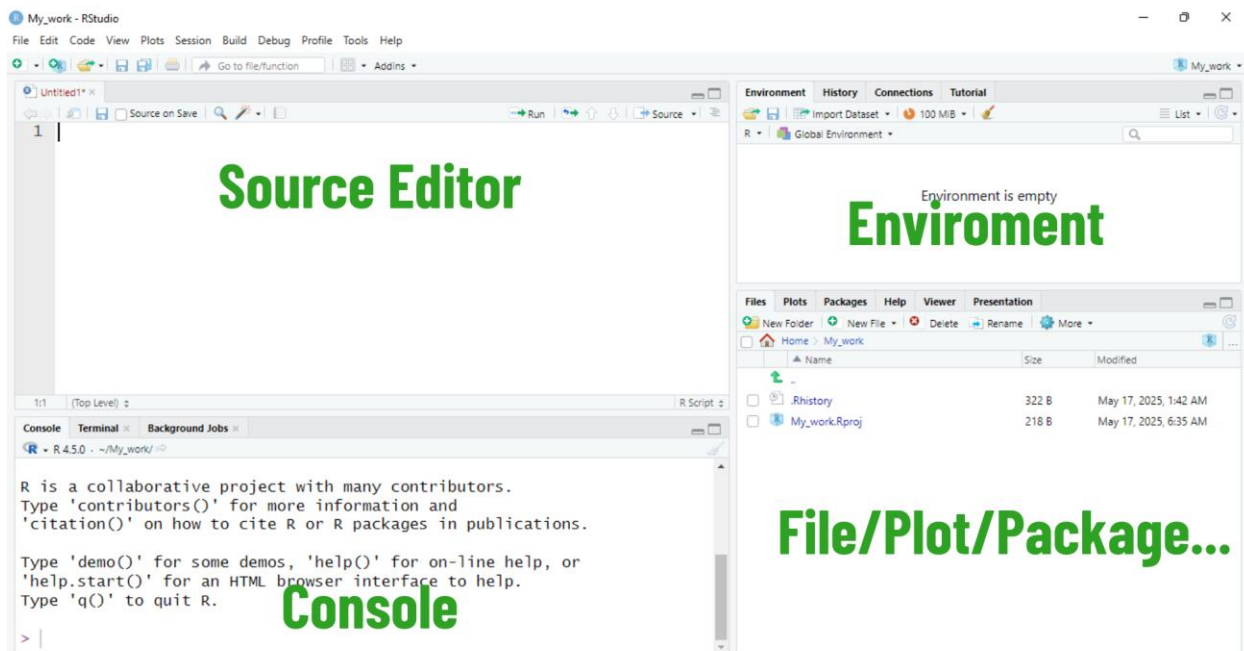
RStudio Interface

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.

RStudio Interface



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()`

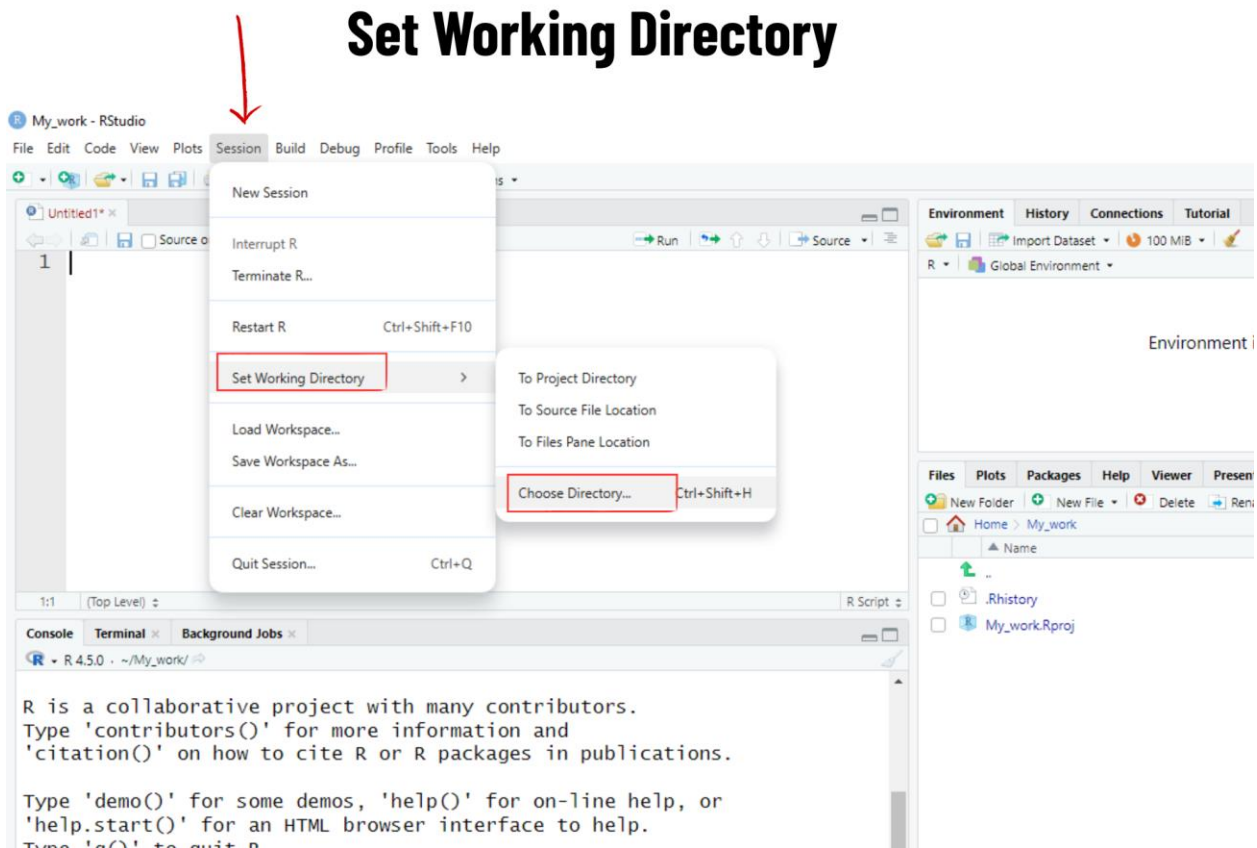
To set up a new working directory, use a command.

`setwd(folder path)`

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

OR

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



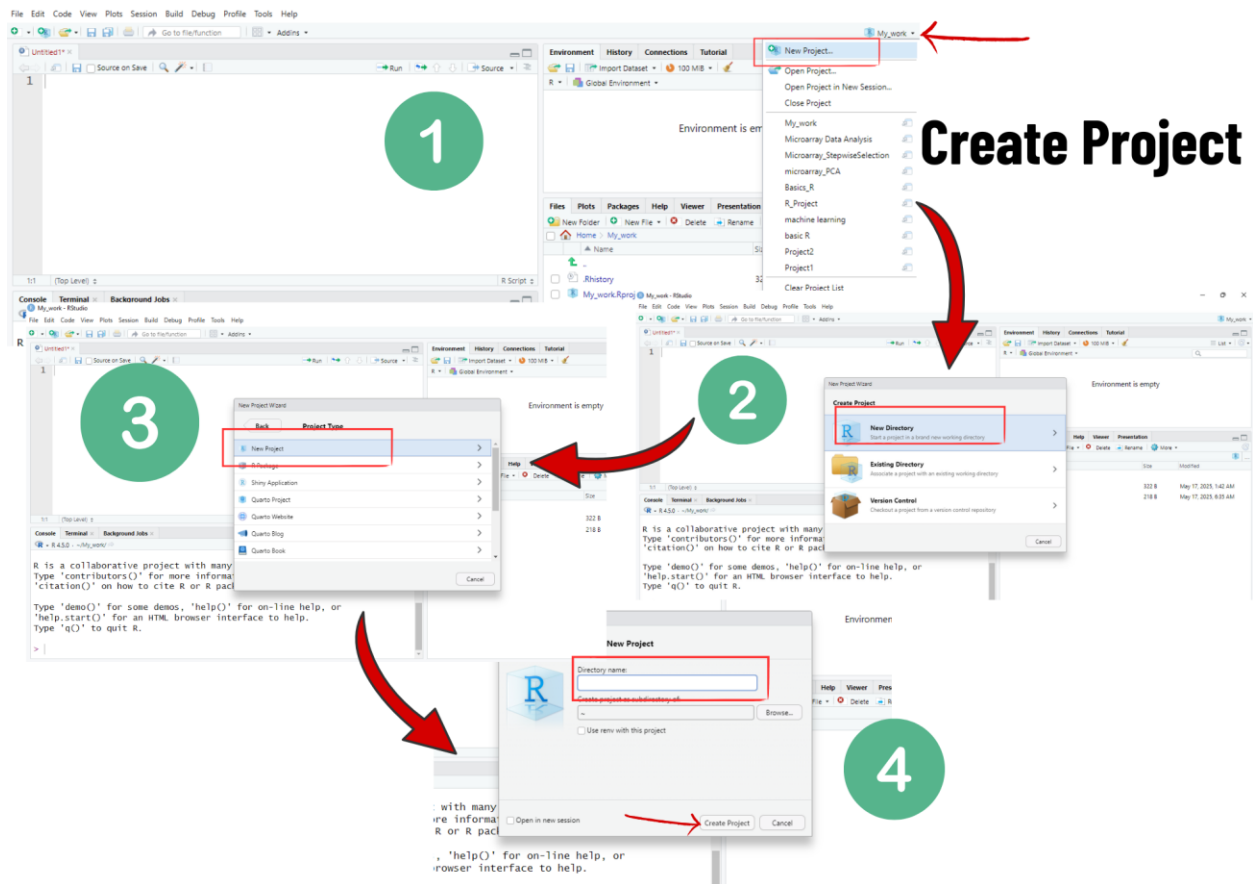
Working without setting up a directory is the same as working in a lab without a designated bench. Everything scattered, and it becomes hard to keep track of your data, scripts and results. But when you set a working directory, all stays in one place, and you can work effortlessly.

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>