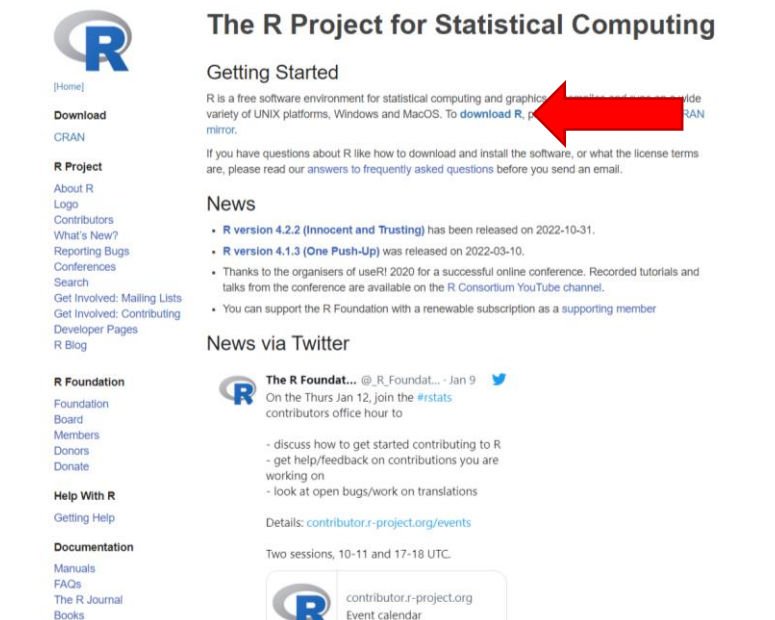


OVERVIEW

This short tutorial walks through how to install R and RStudio on your personal machine or laptop. The computers in our classroom have these software installed, as does the [Virtual Workstations](#) maintained by the A-School, but you will appreciate having direct access. R and RStudio are separate software applications and **you must** have both installed in order to complete the exercises in this course. The first thing to know, is that RStudio is an [integrated development environment](#) or IDE that makes it easier for us to interact with R, but you have to install both R and RStudio (i.e., RStudio alone is useless for our purposes).

WINDOWS USERS

First we will install R. Open your preferred internet browser and visit <https://www.r-project.org>. Now, click the “download R” link near the middle of the page under “Getting Started.”



The screenshot shows the homepage of 'The R Project for Statistical Computing'. On the left is a navigation menu with links like [Home], Download, CRAN, R Project, About R, Logo, Contributors, What's New?, Reporting Bugs, Conferences, Search, Get Involved: Mailing Lists, Get Involved: Contributing, Developer Pages, R Blog, R Foundation, Foundation, Board, Members, Donors, Donate, Help With R, Getting Help, and Documentation. The main content area has a 'Getting Started' section with a paragraph about R being a free software environment. A red arrow points to the 'download R, p' link in this section. Below this is a 'News' section with bullet points about R version 4.2.2 and 4.1.3. Further down is a 'News via Twitter' section with a tweet from @R_Foundat... about a contributors office hour. At the bottom, there is a box for the 'contributor.r-project.org Event calendar'.

Next, select a CRAN location (a mirror site) and click the corresponding link. They are all the same, but the mirror site hosted at Duke University is physically closest to us.

Click on the “Download R for Windows” link near the top of the page.



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[Mirrors](#)
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[Contributed](#)

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 Platforms

Windows and Mac users most likely want to download the precompiled binaries listed in the upper box, not the source code. The sources have to be compiled before you can use them. If you do not know what this means, you probably do not want to do it!

- The latest release (2022-10-31, Innocent and Trusting) [R-4.2.2.tar.gz](#), read [what's new](#) in the latest version.
- Sources of [R alpha and beta releases](#) (daily snapshots, created only in time periods before a planned release).
- Daily snapshots of current patched and development versions are [available here](#). Please read about [new features and bug fixes](#) before filing corresponding feature requests or bug reports.
- Source code of older versions of R is [available here](#).
- Contributed extension [packages](#)

Questions About R

- If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email.

What are R and CRAN?

R is 'GNU S', a freely available language and environment for statistical computing and graphics which provides a wide variety of statistical and graphical techniques: linear and nonlinear modelling, statistical tests, time series analysis, classification, clustering, etc. Please consult the [R project homepage](#) for further information.

CRAN is a network of ftp and web servers around the world that store identical, up-to-date, versions of code and documentation for R. Please use the CRAN [mirror](#) nearest to you to minimize network load.

Submitting to CRAN

To "submit" a package to CRAN, check that your submission meets the [CRAN Repository Policy](#) and then use the [web form](#).

Now click on the "install R for the first time" link at the top of the page.



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R for Windows

Subdirectories:

- [base](#)
- [contrib](#)
- [old contrib](#)
- [Rtools](#)

Binaries for base distribution. This is what you want to [install R for the first time](#).

Binaries of contributed CRAN packages (for R >= 3.4.x).

Binaries of contributed CRAN packages for outdated versions of R (for R < 3.4.x).

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 binaries.

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

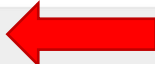
Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables.

We're getting there! Next, click "Download R for Windows" and save the executable file somewhere on your computer.



CRAN
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R-4.2.2 for Windows

[Download R-4.2.2 for Windows](#) (76 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, UCRT has to be installed manually from [here](#).

If you want to double-check that the package you have downloaded matches the package distributed by CRAN, you can compare the [md5sum](#) of the .exe to the [fingerprint](#) on the master server.

Frequently asked questions

- [Does R run under my version of Windows?](#)
- [How do I update packages in my previous version of R?](#)

Please see the [R FAQ](#) for general information about R and the [R Windows FAQ](#) for Windows-specific information.

Other builds

- Patches to this release are incorporated in the [r-patched snapshot build](#).
- A build of the development version (which will eventually become the next major release of R) is available in the [r-devel snapshot build](#).
- [Previous releases](#)

Note to webmasters: A stable link which will redirect to the current Windows binary release is [CRAN_MIRROR/bin/windows/base/release.html](#).

Last change: 2022-10-31

Run the .exe file that you just downloaded and follow the installation instructions.

Next, you should go ahead and install RTools as well because it will save you some time later on in the course when we want to use packages that “live” on GitHub:



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R for Windows

Subdirectories:

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[contrib](#) Binaries of contributed CRAN packages (for R >= 3.4.x).

[old-contrib](#) Binaries of contributed CRAN packages for outdated versions of R (for R < 3.4.x).

[Rtools](#) Binaries 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 binaries.

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.

Click the installer link for RTools on the next page, then run the downloaded executable to install.

Now that R and RTools are installed on your system, you **still need to download and install RStudio**.

Open another web browser tab and navigate to <https://posit.co/download/rstudio-desktop>. Click the “Install RStudio” button shown below.

 PRODUCTS ▾ SOLUTIONS ▾ LEARN & SUPPORT ▾ EXPLORE MORE ▾

Q

1: Install R

RStudio requires R 3.3.0+. Choose a version of R that matches your computer's operating system.

[DOWNLOAD AND INSTALL R](#)

2: Install RStudio

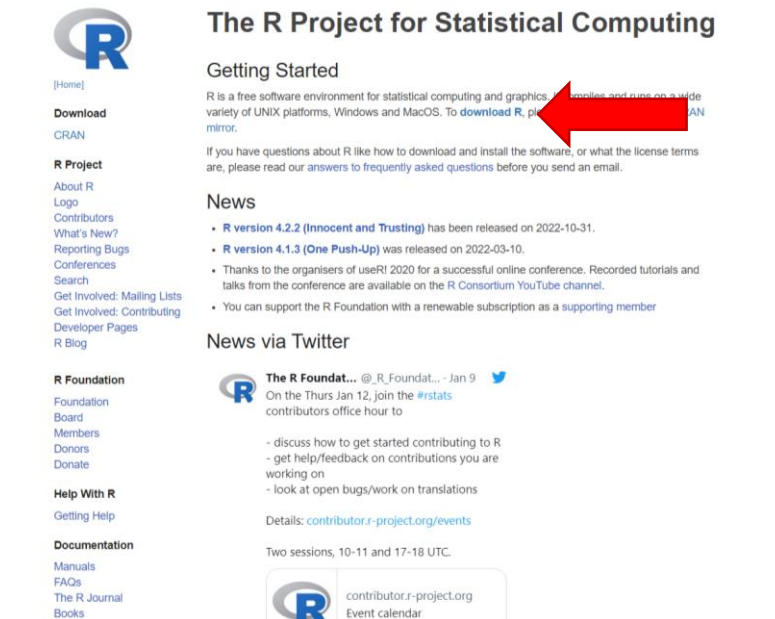
[DOWNLOAD RSTUDIO DESKTOP FOR WINDOWS](#)

Size: 202.76MB | [SHA-256: FD8EA4B4](#) | Version: 2022.12.0+353 |
Released: 2022-12-15

Unzip and run the .exe file you just downloaded and follow the installation instructions.

MAC USERS

Again, the first step is to install R. Open your preferred internet browser and visit <https://www.r-project.org>. Now, click the “download R” link near the middle of the page under “Getting Started.”



The R Project for Statistical Computing

Getting Started

R is a free software environment for statistical computing and graphics. It runs on a wide variety of UNIX platforms, Windows and MacOS. To [download R](#), please visit the CRAN mirror.

If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email.

News

- **R version 4.2.2 (Innocent and Trusting)** has been released on 2022-10-31.
- **R version 4.1.3 (One Push-Up)** was released on 2022-03-10.
- Thanks to the organisers of useR! 2020 for a successful online conference. Recorded tutorials and talks from the conference are available on the R Consortium YouTube channel.
- You can support the R Foundation with a renewable subscription as a [supporting member](#)

News via Twitter

The R Foundat... @R_Foundat... · Jan 9

On the Thurs Jan 12, join the [#rstats](#) contributors office hour to

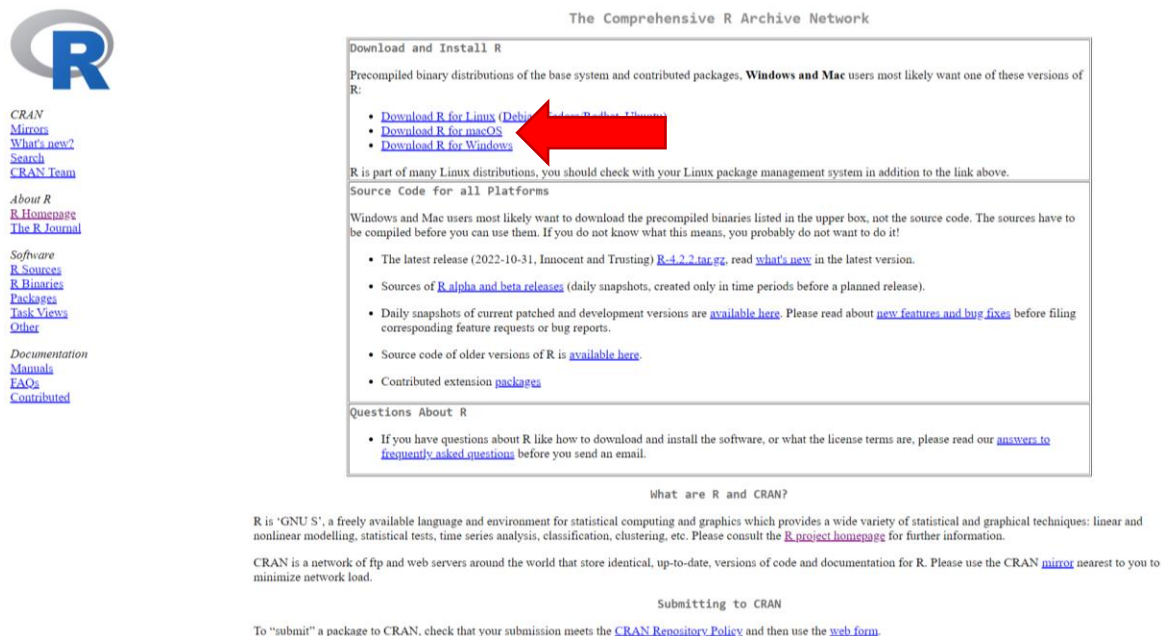
- discuss how to get started contributing to R
- get help/feedback on contributions you are working on
- look at open bugs/work on translations

Details: contributor.r-project.org/events

Two sessions, 10-11 and 17-18 UTC.

contributor.r-project.org
Event calendar

Next, select a CRAN location (a mirror site) and click the corresponding link. They are all the same, but the mirror site hosted at Duke University is physically closest to us. Click on the “Download R for macOS” link near the top of the page.



The Comprehensive R Archive Network

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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 Platforms

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- The latest release (2022-10-31, Innocent and Trusting) [R-4.2.2.tar.gz](#), read [what's new](#) in the latest version.
- Sources of [R alpha and beta releases](#) (daily snapshots, created only in time periods before a planned release).
- Daily snapshots of current patched and development versions are [available here](#). Please read about [new features and bug fixes](#) before filing corresponding feature requests or bug reports.
- Source code of older versions of R is [available here](#).
- Contributed extension [packages](#)

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- If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email.

What are R and CRAN?

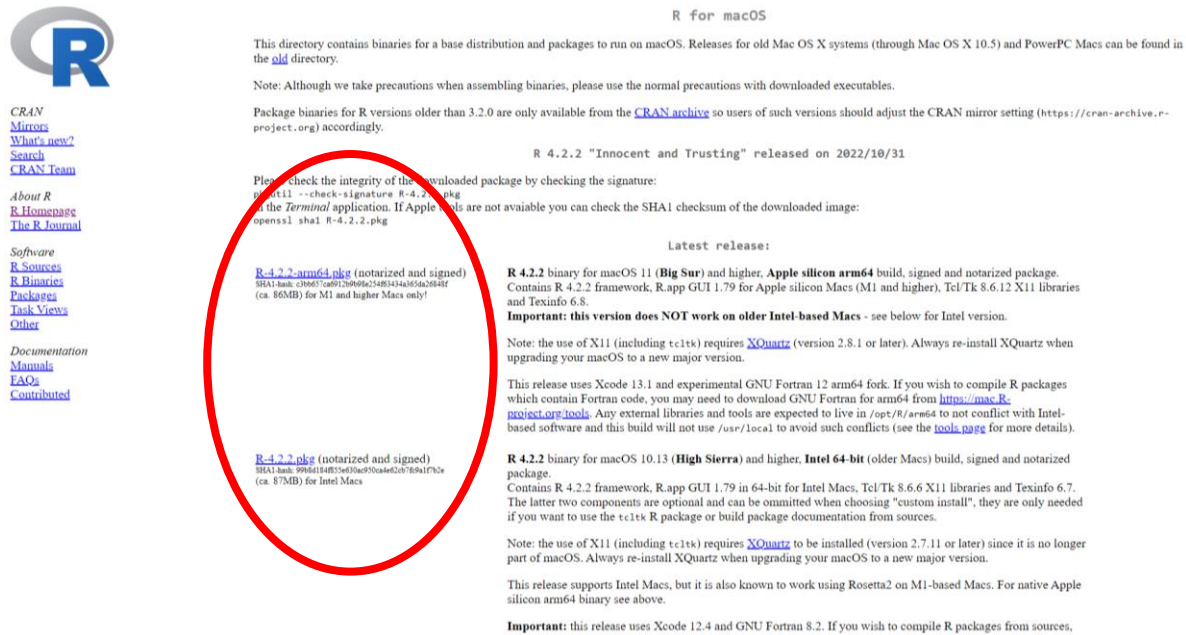
R is 'GNU S', a freely available language and environment for statistical computing and graphics which provides a wide variety of statistical and graphical techniques: linear and nonlinear modelling, statistical tests, time series analysis, classification, clustering, etc. Please consult the [R project homepage](#) for further information.

CRAN is a network of ftp and web servers around the world that store identical, up-to-date, versions of code and documentation for R. Please use the CRAN [mirror](#) nearest to you to minimize network load.

Submitting to CRAN

To “submit” a package to CRAN, check that your submission meets the [CRAN Repository Policy](#) and then use the [web form](#).

Click on the file containing the latest version of R that is appropriate for your machine.



R for macOS

This directory contains binaries for a base distribution and packages to run on macOS. Releases for old Mac OS X systems (through Mac OS X 10.5) and PowerPC Macs can be found in the [old](#) directory.

Note: Although we take precautions when assembling binaries, please use the normal precautions with downloaded executables.

Package binaries for R versions older than 3.2.0 are only available from the [CRAN archive](#) so users of such versions should adjust the CRAN mirror setting (<https://cran.archive.r-project.org>) accordingly.

R 4.2.2 "Innocent and Trusting" released on 2022/10/31

Please check the integrity of the downloaded package by checking the signature:

```
openssl shasum -c R-4.2.2.pkg
```

If the `Terminal` application. If Apple tools are not available you can check the SHA1 checksum of the downloaded image:

```
openssl sha1 R-4.2.2.pkg
```

Latest release:

R 4.2.2-arm64.pkg (notarized and signed)
SHA1 hash: 99661148154030a0a62c0769a1f70c
(ca. 86MB) for M1 and higher Macs only!

R 4.2.2.pkg (notarized and signed)
SHA1 hash: 99661148154030a0a62c0769a1f70c
(ca. 87MB) for Intel Macs

R 4.2.2 binary for macOS 11 (Big Sur) and higher, Apple silicon arm64 build, signed and notarized package.
Contains R 4.2.2 framework, Rapp GUI 1.79 for Apple silicon Macs (M1 and higher), Tcl/Tk 8.6.12 X11 libraries and Texinfo 6.8.
Important: this version does NOT work on older Intel-based Macs - see below for Intel version.

Note: the use of X11 (including `tcltk`) requires [XQuartz](#) (version 2.8.1 or later). Always re-install XQuartz when upgrading your macOS to a new major version.

This release uses Xcode 13.1 and experimental GNU Fortran 12 arm64 fork. If you wish to compile R packages which contain Fortran code, you may need to download GNU Fortran for arm64 from <https://mac.R-project.org/tools>. Any external libraries and tools are expected to live in `/opt/R/arm64` to not conflict with Intel-based software and this build will not use `/usr/local` to avoid such conflicts (see the [tools page](#) for more details).

R 4.2.2 binary for macOS 10.13 (High Sierra) and higher, Intel 64-bit (older Macs) build, signed and notarized package.
Contains R 4.2.2 framework, Rapp GUI 1.79 in 64-bit for Intel Macs, Tcl/Tk 8.6.6 X11 libraries and Texinfo 6.7. The latter two components are optional and can be omitted when choosing "custom install", they are only needed if you want to use the `tcltk` R package or build package documentation from sources.

Note: the use of X11 (including `tcltk`) requires [XQuartz](#) to be installed (version 2.7.11 or later) since it is no longer part of macOS. Always re-install XQuartz when upgrading your macOS to a new major version.

This release supports Intel Macs, but it is also known to work using Rosetta2 on M1-based Macs. For native Apple silicon arm64 binary see above.

Important: this release uses Xcode 12.4 and GNU Fortran 8.2. If you wish to compile R packages from sources,

Save the .pkg file, double-click it to open, and follow the installation instructions.

Now that R is installed on your system, you **still need to download and install RStudio**.

Open another web browser tab and navigate to <https://posit.co/download/rstudio-desktop>. The website should automatically detect your operating system, but if not just scroll down and click on the appropriate link:

OS	Download	Size	SHA-256
Windows 10/11	RSTUDIO-2022.12.0-353.EXE ±	202.76MB	FD8EA4B4
macOS 11+	RSTUDIO-2022.12.0-353.DMG ±	365.70MB	FD48EBB5
Ubuntu 18+/Debian 10+	RSTUDIO-2022.12.0-353-AMD64.DEB ±	131.19MB	23CAE58F
Ubuntu 22	RSTUDIO-2022.12.0-353-AMD64.DEB ±	131.94MB	8BC3F84D
Fedora 19/Red Hat 7	RSTUDIO-2022.12.0-353-X86_64.RPM ±	145.98MB	A717CDAD

Save the .dmg file on your computer, double-click it to open, and then drag and drop it to your applications folder.

Finally, RTools is only for Windows machines, but for Mac users you should only need to install [Xcode Command Line Tools](#). To do this, open a terminal window, click Spotlight search in the top right of your screen, then search for “Terminal”. Next copy and paste the following into the terminal and press Enter:

```
xcode-select --install
```

You will probably need to provide your password to enable installing the software. Follow any onscreen instructions and wait for it to finish. You can now compile R packages that do not yet exist on the CRAN mirror sites (e.g., newer packages that are hosted on GitHub).

EXTRA PRACTICE

If you have the time and inclination, take a look at [this online tutorial](#) after you have finished installing R and RStudio. Skip down to “Create an RStudio project” and open RStudio on your machine (note that this tutorial **assumes you are logging into a cloud-based instance of RStudio Server**, which we are not doing so NBD) to begin exploring R.

This would be a nice segue for the next class meeting.