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Software for your own computer: R, RStudio, LaTeX, PsychoPy

You do not need your own computer for this class. There are, however, four software packages that you might want to install on your own computer, if you have one. They will allow you to work on the various class assignments away from the computing laboratory. The programs are: R, RStudio, LaTeX, and PsychoPy. All four are free.

- R is a free, powerful, open source statistical platform that offers state-of-the-art statistical analyses and graphing of data (R Core Team, 2018).

- RStudio (RStudio Team, 2016) is a user interface to R that is powerful, easy to use and overall better than the standard user interface that comes with R itself. RStudio is free and requires R to be installed.

- LaTeX is one oldest the typesetting systems for making beautiful documents from plain text. It is the de facto standard for publication of scientific documents in many fields and it is free. RStudio has popularized a simple way (R Markdown) to produce nicely formatted documents from plain text that allows you to produce formatted documents as pdf files (among other formats). R Markdown documents can contain formatted text intermixed with R code. We will use R Markdown for homework and lab reports. In order to create pdf files from R Markdown you will need to install LaTeX on your computer.

- PsychoPy is a free, open-source program that allows you to design and run experiments that use visual and auditory stimuli (Peirce, 2007, 2009). PsychoPy presents your stimuli, collects your data, and writes them into files that can then be analyzed by statistical programs, like R.

Remember, you don't need these programs on your own computer unless you want to work on homework and lab reports in places other than Muenzinger D346, E311, or E0014. If you already have R and RStudio installed on your computer, please update them to the latest version (see below).

How to install R on your computer

1. Go to the R web site: https://www.r-project.org
2. Click on the CRAN link in the upper left part of the R page
3. You will probably be asked to choose a site from which to download R. You might see a long list of mirror sites (identical content). Choose *https://cloud.r-project.org*, and R will use a mirror site that is close to you and not overloaded.
4. At the top of the download page you have three choices for precompiled binary versions: one for Windows, one for Mac, and one for Linux. Double click on the version appropriate for your computer to start the download.

After the downloaded has finished, double click on the package to run the installer. Simply follow the instructions and the latest version of R will be installed (version 3.5.2) 2018-12-20 "Eggshell Igloo" is the latest as of this writing).

Add-on Packages in R:
One of the many advantages of R is that it is extendable. On this date, there are 13,676 add-on packages for extending the power and capabilities of the basic R system! You can download and install the packages you need when you need them from the R program itself or from RStudio. Packages, and their dependencies, that you will certainly need to install easily installed using the R script entitled "R Package Installer for PSYC 4165.R" that you can download from the course web page. Run the script in RStudio: it will install additional packages that you will need for the course.

How to install RStudio on your computer

RStudio is a free and a more flexible interface to R than the console interface that comes with the R installation. It makes R easier to use. RStudio also the use of R-markdown language to prepare documents and reports that include the results of R calculations. You will use RStudio to prepare your homework and lab reports. After you install R (see above) follow these steps:

1. Go to the RStudio web site: https://www.rstudio.com https://www.rstudio.com
2. Click on the large Download button
3. Choose the free version and download the file for RStudio Desktop
4. Open the downloaded file and drag the RStudio application to your Applications folder. The current version as of this writing is v 1.1.463

R seems intimidating for beginners but really, all kidding aside, it is not complicated to use. You have all used R in PSYC 2111 and in PSYC 3111 and it is usual to forget a lot when you don't use it every day. We will help you: please don't despair. Once you have R and RStudio installed on your computer, follow this free Introduction to R. You will learn most of the basic skills needed to move on to do the actual course work.

https://www.datacamp.com/courses/free-introduction-to-r/

How to install LaTeX on your computer

RStudio has popularized a simple way to produce nicely formatted documents from plain text that allows you to produce documents in html, pdf, and Microsoft Word called R Markdown. We will use R Markdown for homework and lab reports. You will need to install LaTeX on your computer because RStudio uses LaTeX to create pdf documents from R-Markdown. You do not need to know how to use LaTeX; RStudio takes care of that for you! These instructions are the same for Mac, Windows, and Linux computers.

1. First make sure that the R *tinytex* package is installed in your copy of R
    a. In RStudio, click on the Packages tab (RStudio lower right pane) and check if *tinytex* is installed;
    b. If not installed, install it. Click on the Install tab and type *tinytex* and then click on the Install button
2. After *tinytex* is installed in R, in the console window of RStudio (lower left pane) type the command tinytex::install_tinytex(). Tinytex should then be installed on your computer. It will take a couple of minutes, depending on your internet connection.
3. Later, when you are rendering R markdown files to pdf, you might be asked to install additional LaTeX packages. Always agree.
4. Sometimes, for reasons that are obscure, tinytex does not succeed in installing LaTeX. If this happens to you, go to the LaTeX web page and follow their instructions for installing it on your computer: https://www.latex-project.org/get/ .
5. After the LaTeX system is installed on your computer, test it out. Open RStudio and from the File > New File menu choose R Markdown. Save the file with a name. The new document contains sample R Markdown code. Render the document to pdf using the *knit* tab to see if it works.

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How to install PsychoPy3 on your computer

PsychoPy3 is a computer program that allows you do design and carry out psychological experiments that use visual and/or auditory stimuli. It is written in Python 3 by Jonathan Peirce at the University of Nottingham, England (Peirce, 2007, 2009; Peirce & MacAskill, 2018). It has a graphical interface that makes it relatively easy to make experiments happen. All the experiments that we have prepared for you in this course have been created in PsychoPy.

1. Go to the PsychoPy website: https://github.com/psychopy/psychopy/releases
2. The latest version, at this time, is v3.0.1. There are different download packages under Downloads. Download one of the two standalone packages that you need: One is for the Mac and one is for Windows:
   StandalonePsychoPy3-3.0.1-MacOS.dmg
   StandalonePsychoPy3-3.0.1-win32.exe
3. Mac Version: Double-click on the downloaded file to mount and open it. Drag the PsychoPy3 program to your computer (e.g., in the Applications folder).
4. Windows Version: Double-click on the downloaded file to run the .exe file and install PsychoPy3.

References

Peirce, J. W. (2007). PsychoPy--Psychophysics software in Python. *Journal of Neuroscience Methods, 162*(1-2), 8-13. doi:10.1016/j.jneumeth.2006.11.017

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