April / May 2020 - Learn R

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Session times: **Tues and Thurs at 5:10PM-6:10PM (approx)**

Delivery method: **Online via zoom** (<https://zoom.us/j/3425733273>)

Session material will be available at [R Sessions](https://drive.google.com/drive/folders/1mesvdip5w8SEOqFFUhyVhbZW6xC2H7Nl?usp=sharing) (google drive folder)

Classes have ended. Check out this link for doing genomics in R: <http://www.sthda.com/english/wiki/genomics>

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| Wk | Date | Session | Summary | Useful Links | Practice/Quiz |
| I | Apr 16  (0) | What is programming/coding? | - process of creating a set of instructions that tell a computer how to perform a task  - can be done using a variety of computer "languages," such as R, Java, and Python | Watch this: [What is Programming? (2 min video)](https://www.khanacademy.org/computing/computer-programming/programming/intro-to-programming/v/programming-intro) |  |
|  |  | Install R and RStudio | - learn how to install R | [Download R and RStudio | UT.7.01x](https://courses.edx.org/courses/UTAustinX/UT.7.01x/3T2014/56c5437b88fa43cf828bff5371c6a924/) |  |
|  |  | Explore the workspace | - set and getwd() | [The Workspace](https://www.statmethods.net/interface/workspace.html) |  |
| II | Apr 21  (1) | Information about sessions |  |  |  |
|  |  | Introduction to R | Features  - base r and extensive libraries “packages”  - Bioconductor and CRAN  - RStudio interface | [What is R and Why Learning R Programming - Easy Guides - Wiki](http://www.sthda.com/english/wiki/what-is-r-and-why-learning-r-programming) | **Quiz 1:** <https://forms.gle/HWTH5TR7ThCSD79k9> |
|  |  |  | Programming basics  - variables (objects)  - assignment operator  - data types of variables (integer, character, logical)  - operators (arithmetic, relational, logical)  - () | - \*\*[Easy R Programming Basics - Easy Guides - Wiki](http://www.sthda.com/english/wiki/easy-r-programming-basics)  - [Introduction to R](https://uoftcoders.github.io/studyGroup/lessons/r/intro/lesson/) (full tutorial) |  |
|  | Apr 23  (2) | Data structures in R | - use the iris dataset  - vectors and vector functions (sort, max, min)  - calculate simple statistics like mean, variance, standard deviation | -[Descriptive Statistics and Graphics -Easy Guides - Wiki](http://www.sthda.com/english/wiki/descriptive-statistics-and-graphics) \* | **Quiz 2:**  <https://forms.gle/rzjwwfLgY6ECZat47> |
|  |  |  | - the dataframe (cols/rows)  - how to access data  - subset | [Addressing Data – Programming with R](https://swcarpentry.github.io/r-novice-inflammation/10-supp-addressing-data/index.html) |  |
| III | Apr 28  (3) | Import and export tabular data | - read in csv and tab-delimited txt files  - save objects as csv or RData  - Excel package | [Reading and Writing CSV Files – Programming with R](https://swcarpentry.github.io/r-novice-inflammation/11-supp-read-write-csv/index.html) | **Quiz 3:**  <https://forms.gle/yViKMKj2p2nD4dsB9> |
|  |  | Basic graphs | - plot()  - save files: png()/pdf() | [Generic plot types in R software - Easy Guides - Wiki](http://www.sthda.com/english/wiki/generic-plot-types-in-r-software)  [R Base Graphics](https://rstudio-pubs-static.s3.amazonaws.com/7953_4e3efd5b9415444ca065b1167862c349.html) |  |
|  | Apr 30  (4) | Introduction to ggplot2 | - R colors (RColorBrewer/ggsci)  - ggplot2 | [Introduction to ggplot2](https://uoftcoders.github.io/studyGroup/lessons/r/ggplot2/lesson/)  [ggplot cheat sheet](http://www.sthda.com/english/articles/32-r-graphics-essentials/125-ggplot-cheat-sheet-for-great-customization) | **Quiz 4:**  <https://forms.gle/zCiGbfp4iSNTGauf9> |
| IV | May 5  (5) | Statistical tests | - ggplot quiz  - 2 samples (t-test, wilcoxin)  - testing for multiple comparisons  - > 2 samples (ANOVA) |  | **Quiz 5:**  <https://forms.gle/eR6HvLNb5An4hbpw7> |
|  | May 7  (6) | Correlation analysis | - pearson correlation  - corrplot package | [Correlation Analysis in R](http://www.sthda.com/english/wiki/wiki.php?title=correlation-analyses-in-r) | **Quiz 6:**  <https://forms.gle/hNBf5BMF9jHPpPo4A> |
| V | May 12  (7) | Heatmaps | - imputation and log normalisation  - heat maps | [Make heatmaps in R with pheatmap](https://slowkow.com/notes/pheatmap-tutorial/) |  |
| VI | May 19  (8) | Differential gene expression analysis | - RNA seq  - edgeR and limma packages | [RNA-seq analysis is easy as 1-2-3 with limma, Glimma and edgeR](https://www.bioconductor.org/packages/devel/workflows/vignettes/RNAseq123/inst/doc/limmaWorkflow.html) |  |
|  | May 21  (9) | Data manipulation | - tidyverse package (dplyr or tidyr)  - pipes | [Data Manipulation in R](https://www.datanovia.com/en/courses/data-manipulation-in-r/) |  |
| VII | May 28  (10) | Conditions | - general expressions - grep, grepl  - make a conditional  - if/else statements | [Making Choices – Programming with R](https://swcarpentry.github.io/r-novice-inflammation/04-cond/index.html) |  |
| VIII | June 2  (11) | Repetitive jobs | - loops | [Analyzing Multiple Data Sets – Programming with R](https://swcarpentry.github.io/r-novice-inflammation/03-loops-R/index.html) |  |
|  |  |  | - vectorization and the apply family |  |  |
|  |  |  | - make your own functions syntax and examples | [Creating Functions – Programming with R](https://swcarpentry.github.io/r-novice-inflammation/02-func-R/) |  |