

# Course Introduction: GSND 5340Q

## High Throughput Biomedical Data Analysis (BMDA)

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## Section 1

### Course Details

# Introductions!



# A Post-COVID Perspective





The poster features a yellow header with the text "2024 STUDENT DATA SCIENCE CONFERENCE". Below this is a large red title "STUDENT DATA SCIENCE CONFERENCE". To the right is a photograph of a desert landscape with red rock formations. A red starburst shape contains the text "21 - 24 MAY" and "SOUTHERN UTAH UNIVERSITY". Below the starburst, the text "CO-SPONSORED BY RUTGERS HEALTH" is displayed, followed by "The Rutgers Center for Data Science, Southern Utah University, and Red Rock Data Science." At the bottom, it says "REGISTRATION: DETAILS COMING SOON". On the left side, there are three circular images with corresponding text: "POSTER SESSION" (showing people looking at posters), "DATA SCIENCE WORKSHOP" (showing two people working on a computer), and "NETWORKING" (showing two people talking).

## Goals of the Red Rock Data Science Student Conference

- 1. Student-focused (graduate and undergraduate) conference in Data Science:** a venue for students to present their own research and learn about the scholarly work of others.
- 2. Network with Data Science students at other universities:** The conference will provide workshops, poster sessions, oral presentations, and outdoor excursions for this purpose.
- 3. Connect students with companies and recruiters who are actively hiring graduates with Data Science related degrees.**

Go to: <https://www.redrockdatascience.com>



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# Things you should know about this course

- Please fill out the following survey:  
<https://forms.gle/XSPjJjMsUa9EWXo2A>
- Zoom:
  - Click here for the Zoom link
- GitHub:
  - [https://github.com/wevanjohnson/2024\\_Spring\\_BDMA](https://github.com/wevanjohnson/2024_Spring_BDMA)
- Link to Syllabus
- Lots of diverse material
  - Not a spectator sport!
- Learning to program in R is a requirement of this course.

## Section 2

Learning R

# R Tutorials (YouTube)

Dr. Johnson will provide an online R tutorial on GitHub:  
[https://github.com/wewanjohnson/2024\\_04\\_R\\_tutorial](https://github.com/wewanjohnson/2024_04_R_tutorial)

Please complete Lectures 1-6 ASAP (required). In addition, plan to complete Lectures 7-12 by at least the end of the course.

Day	Topics
Lecture 1	Installing R, RStudio, and R packages
Lecture 2	Introduction to R/RStudio
Lecture 3	R basics, Part 1
Lecture 4	R basics, Part 2
Lecture 5	R basics, Part 3
Lecture 6	Programming Basics
Lecture 7	R Markdown
Lecture 8	Input/output data, Data structures
Lecture 9	The tidyverse
Lecture 10	Visualization with ggplot2, Part 1
Lecture 11	Visualization with ggplot2, Part 2
Lecture 12	Visualization with ggplot2, Part 3
Lecture 13	Creating R Packages
Lecture 14	Shiny Programming, Part 1
Lecture 15	Shiny Programming, Part 2

## Section 3

### Installation Details

# Important installations

You will need to install the following:

## Mac Users

- R and R Studio
- Know how to access a terminal (Rstudio or Terminal)
- git (type `git --version` in the terminal)

## Windows Users:

- R and R Studio
- A terminal app (Git Bash, MobaXterm, Putty)
- Git for Windows

# R and Rstudio

See instructions at:

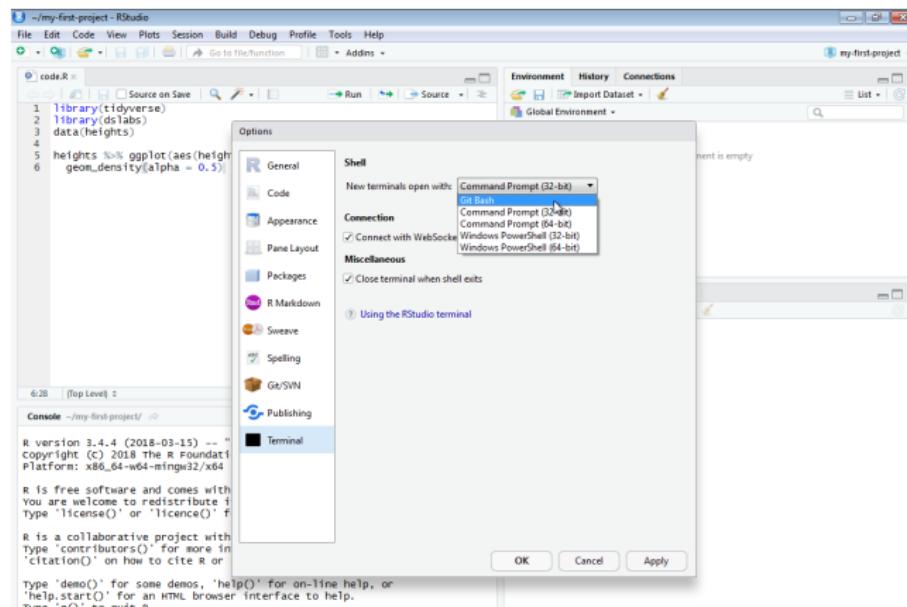
<https://rafalab.github.io/dsbook/installing-r-rstudio.html>

# Accessing the terminal and installing Git

See instructions at: <https://rafalab.github.io/dsbook/accessing-the-terminal-and-installing-git.html>

# For Windows: link Git Bash and RStudio

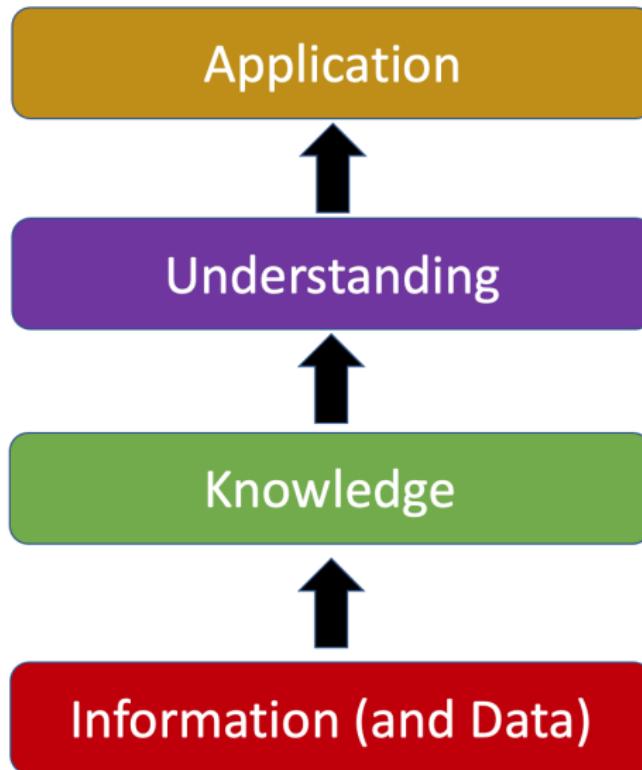
We can access the terminal either through RStudio or by opening Git Bash directly. For RStudio, set Git Bash as the default Unix shell: go to preferences (under the File pull down menu), then select Terminal, then select Git Bash:



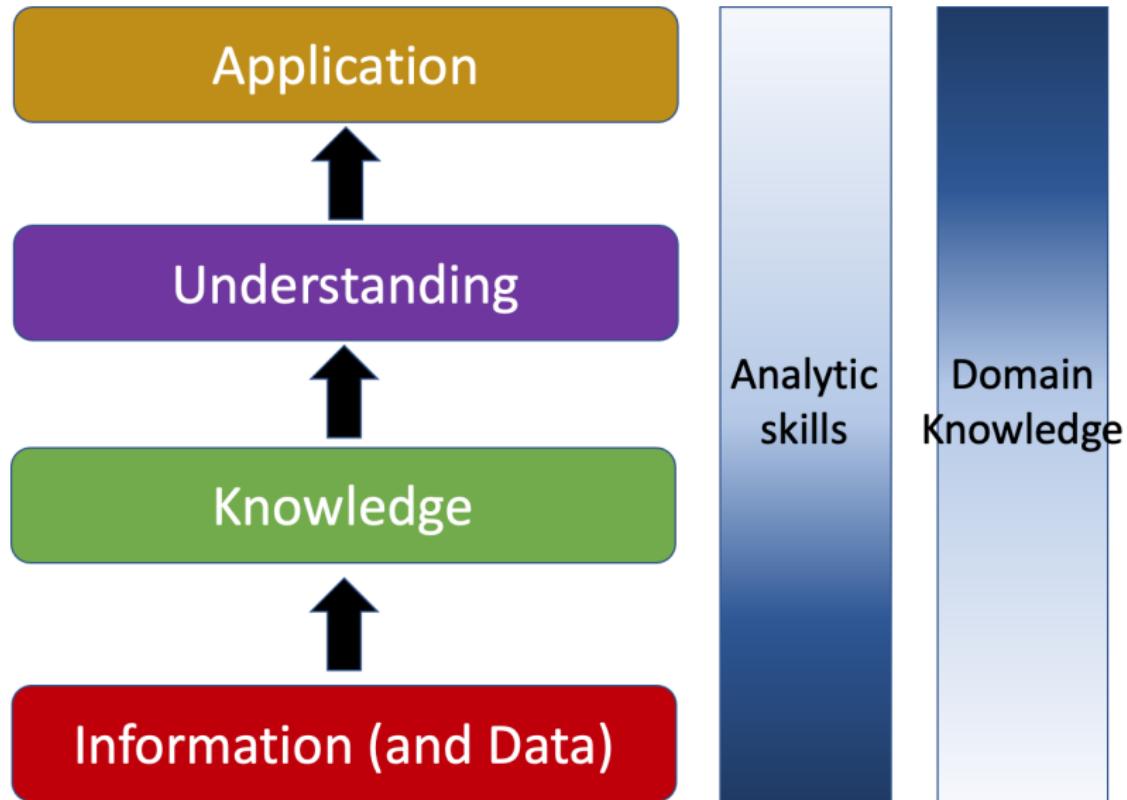
## Section 4

### Introduction to BMDA

# Analytics Hierarchy



# Analytics Hierarchy



# Session info

```
sessionInfo()
```

```
## R version 4.3.2 (2023-10-31)
## Platform: aarch64-apple-darwin20 (64-bit)
## Running under: macOS Sonoma 14.2.1
##
## Matrix products: default
## BLAS:    /Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/lib/libRblas.0.dylib
## LAPACK:  /Library/Frameworks/R.framework/Versions/4.3-arm64/Resources/lib/libRlapack.dylib;  LAPACK version 3
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## time zone: America/Denver
## tzcode source: internal
##
## attached base packages:
## [1] stats      graphics   grDevices  utils      datasets   methods    base
##
## loaded via a namespace (and not attached):
## [1] compiler_4.3.2    fastmap_1.1.1    cli_3.6.2       tools_4.3.2
## [5] htmltools_0.5.8   rstudioapi_0.16.0 yaml_2.3.8     rmarkdown_2.26
## [9] knitr_1.45       xfun_0.43       digest_0.6.35   rlang_1.1.3
## [13] evaluate_0.23
```