STAT 184: Introduction to R

Fall 2022

Course Information

Class Time & Location

- Sec 002: Wednesdays & Fridays at 12:20 - 1:10 p.m.

Instructor

Olivia Beck

office: 418 Thomas Building
email: olb5053 [at] psu [dot] edu
office hours: Tuesdays's 10 a.m. - 12 p.m. or by appointment

Grader

Yuqi Hong
email: ykh5213 [at] psu [dot] edu

You may contact Yuqi Hong (cc Olivia Beck) with questions about grading (i.e., if you believe there has been a mistake), but they do not hold scheduled office hours.

Website

Canvas: https://canvas.psu.edu

GitHub Classroom Repository: https://github.com/STAT184-002-fall2022

Cource Materials: https://github.com/STAT184-002-fall2022/course-materials

Laptops I recommend that you bring a computer to class each day if you can, but there's no need or expectation that you buy a computer if you don't already have access to one. You will have access to all the resources you need on the classroom computers. However, it is usually easier to work on your personal machine.

Textbooks

Data Computing (2nd edition) by Daniel Kaplan & Matthew Beckman

Click Here for the Data Computing free ebook.

(*recommended*): **Happy Git and GitHub for the UseR** by Jenny Bryan et al.

Click Here for the Happy Git free ebook.

(*recommended*): **R for Data Science** by Hadley Wickham & Garrett Grolemund

Click Here for the R for Data Science free ebook.

Other readings assigned as needed.

Software/Tools

Get access to R / RStudio right away! We will be walking through this on the first day of class, but it would be helpful to install these early. Get help if needed (Google, Canvas Discussions, friends, office hours).

- RStudio Cloud https://rstudio.cloud/ (free version, use student email)
- Install BOTH R & RStudio on your computer (requires config). Make sure to download the appropriate version for your operating system (Mac or Windows).
  - R software (free): http://cran.rstudio.com/
  - RStudio Desktop (free) https://rstudio.com/products/rstudio/download/

Communication

Canvas Discussion Board We will be using canvas Discussion board for all class Q&A, to help you benefit from each other's questions and the collective knowledge of your classmates, professor, and TA. Questions should be posted to the entire class (for content-related questions). I encourage you to ask questions if you are struggling to understand a concept, and to answer your classmates' questions when you can. Canvas Discussion posts will only be responded to by the Instructor and Grader during business hours.

Do NOT use Canvas Discussion for personal/private matters (grades, accommodations, etc); email those questions or comments to the professor/TA directly, visit office hours, or discuss them in person after class.

Email Most issues about classroom activities should be posted to Canvas Discussion, but you should use email (or a discuss in person or via Zoom) for all personal or private matters. Emails will only be respond to during business hours. Plan accordingly!

Grading

Learning outcomes will be assessed based on performance in each of the following categories accompanied by their impact on the overall grade:

Pct	Assignment Type	Comments
30%	Final Project	Several due dates
20%	Exam	in class; date TBD; maybe week 8 to 10
20%	Weekly Activities	e.g., synthesis activities
20%	Homework Exercises	e.g., end of chapter problem set
10%	Reading Quizzes	e.g. weekly reading assignments

Late Work Nearly all assignments are turned in electronically on Canvas, and many are due at 12:00pm (Eastern) on the specified date. The official time stamp on Canvas will generally be used to determine late work.

Late work is not permitted at all for some assignments (e.g., exam, final project, and a few special cases).

For other regular assignments (e.g., reading quizzes, homework exercises, & activities):

- 80% credit for the first 24 hours after the due time/date;
- 60% credit between 24 & 48 hours after the due time/date;
- 50% credit after 48 hours beyond the due date/time until the last day of classes, December 9th (not the last day of classes)

Final grades Final grades will be awarded based on the following scale:

Grade	Minimum
A	90%
B+	87%
B	80%
C+	77%
C	70%
D	60%
F	0%

Course Assignments

Most weeks will consist of lecture and synthesis activities during lecture time on Wednesday's and Friday's, and reading quizzes and homework exercises due on 12:00 pm the following Wednesday. Students are encouraged to start early on problems an ask questions on Canvas Discussions and in office hours.

Synthesis Activities Most weeks will include a synthesis activity that is generally designed to integrate the main topic of the week with skills, concepts, or tools previously discussed in the class.

These will most often be assigned and begun during class, but often require additional work outside of class to complete. Students are *encouraged* to work together on these assignments, but each student must hand in their own work unless told otherwise.

Reading Quizzes Weekly reading quizzes will be assigned in order to assess comprehension of a reading assignment pertinent to the primary discussion topic(s) that week. Reading quizzes will be due at **12:00 p.m. on Wednesday's**. This allows students to see new content and concepts for the first time at their own pace in order to more effectively use class time to emphasize main points, clear up confusion, etc. The goal of the reading quiz is to hold students accountable for completing the reading each week before class.

Homework Exercises Weekly homework assignments will be assigned after class in order to assess understanding and mastery of new content. Homework will be due at **12:00 p.m. on Wednesday's**. Students are *encouraged* to work together on homework assignments, but each student must hand in their own work.

Exam Midterm Exam will be held on October 24th in class.

Final Project The project will be due by 11:59 PM on December 12th (the first day of Finals Week).

The project will likely consist of two parts: A well-written document including all R code used, and likely a 3-4 minute presentation of your project. The assigned weekly projects from the Data Computing book are good examples of the scale and scope of work expected for a successful project, with the differences that you are expected to do the work independently, the primary data will not be loaded from an R package, and you are responsible for producing the narrative explaining your investigation and conclusions as you work through the analysis.

Course Goals and Objectives

Some goals and objectives may be reduced or expanded as time permits, but a tentative list follows:

- General Tools
  - Become familiar with R programming language
  - Become familiar with RStudio development environment
  - Generate reports and reproducible work with RMarkdown
  - Exposure to Git/GitHub source control
- Navigate basic syntax in R
  - Adopt basic notions of consistent programming style
  - Show proficiency using functions
  - Install and use a variety of contributed R packages
- Read & write multiple data file types using R
  - CSV
  - web scraping
- Show proficiency with basic data wrangling operations using R
  - Principles of "Tidy Data"
  - `tidyverse` package
- Generate descriptive statistics using R
- Show proficiency with layered graphs & data visualization
  - "Glyph-ready Data"
  - `ggplot2` graphics
- Additional topics
  - Basic machine learning
  - Regular expressions
- Possible extensions as time permits
  - Web applications (i.e. Shiny)
  - `lattice` graphics
  - `mosiac` graphics interface
  - Special topics

Policies & Resources

Counseling and Psychological Services (CAPS) Many students at Penn State face personal challenges or have psychological needs that may interfere with interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

Counseling and Psychological Services at University Park (CAPS):

- Phone: 814-863-0395
- Web: http://studentaffairs.psu.edu/counseling/

Penn State Crisis Line (24 hours/7 days/week): 877-229-6400

Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

ECoS Code of Mutual Respect The Eberly College of Science Code of Mutual Respect and Cooperation embodies the values that we hope our faculty, staff, and students possess and will endorse to make the Eberly College of Science a place where every individual feels respected and valued, as well as challenged and rewarded.

Academic Integrity Statement Academic dishonesty is not limited to simply cheating on an exam or assignment. The following is quoted directly from the "PSU Faculty Senate Policies for Students" regarding academic integrity and academic dishonesty:

> Academic integrity is the pursuit of scholarly activity free from fraud and deception and is an educational objective of this institution. Academic dishonesty includes, but is not limited to, cheating, plagiarizing, fabricating of information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students.

All University and Eberly College of Science policies regarding academic integrity/academic dishonesty apply to this course and the students enrolled in this course. Refer to the following URL for further details on the academic integrity policies of the Eberly College of Science: http://www.science.psu.edu/academic/Integrity/index.html. Each student in this course is expected to work entirely on her/his own while taking any exam, to complete assignments on her/his own effort without the assistance of others unless directed otherwise by the instructor, and to abide by University and Eberly College of Science policies about academic integrity and academic dishonesty. Academic dishonesty can result in assignment of "F" by the course instructors or "XF" by Judicial Affairs as the final grade for the student.

Disability Policy Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact Student Disability Resources (SDR; formerly ODS) at 814-863-1807, 116 Boucke, http://equity.psu.edu/student-disability-resources. In order to receive consideration for course accommodations, you must contact ODS and provide documentation (see the guidelines at http://equity.psu.edu/student-disability-resources/guidelines).

Syllabus Changes

This syllabus is subject to change as circumstances warrant; substantive changes will be distributed in writing (e.g., through Canvas) or announced in class.

This document was last modified on September 26, 2022