Statistics 1129 – Spring 2024
Introduction to Computing
9:35-10:50am Monday/Wednesday
Media and Public Affairs, Room 309

Instructor: Dr. Darcy Steeg Morris
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Course Description: This course will introduce basic programming skills and practice how to program in both Python and R. The goal is to use Python and R for effective data analysis. Students will learn how to install and configure software necessary for a statistical programming environment and master the concept of generic programming language. The course covers practical issues in statistical computing which includes reading data in different formats, writing statistical functions, such as correlation and covariance, debugging, organizing code, accessing Python and R packages, data aggregation and group operations, and visualization. This course will teach in a mixture style including lecture, lab coding, and project. Topics in statistical data analysis will provide working examples

Prerequisite(s): None.

Learning Outcomes: As a result of completing this course, students will be able to:

- Explain and use basic concepts in programming.

- Construct and execute basic programs in Python and R.

- Design and implement basic algorithms in Python and R.

- Use external libraries with Python and R packages

- Use Python and R for statistical calculations.

- Graphically visualize data and results of statistical calculations

Reference Books:

(PfDA) *Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython*, 3rd Edition, by Wes McKinney. Electronic version is freely available: https://wesmckinney.com/book/.

(RiA) *R in Action: Data Analysis and Graphics with R*, 2nd edition by Robert Kabacoff. Electronic version is freely available: http://www.cs.uni.edu/~jacobson/4772/week11/R_in_Action.pdf.

Grading:

Homework Assignments	36% (6% each)
Pop Quizzes	25% (5% each)
Midterm Project (Individual)	15%
Final Project (Group)	20%
Attendance	4%

- *Homework Assignments*: Students will complete six homework assignments to demonstrate applied understanding of concepts. Homeworks are individual work – no collaboration other than discussion of concepts. Homework is submitted on Blackboard.

- *Quizzes*: Students will complete six quizzes in class without advance notice. You can drop your lowest quiz grade, with all quizzes equally weighted. If the number of quizzes changes then each quiz weight proportion will be adjusted accordingly from 5%. There are no make-up opportunities if you miss a quiz, unless you have asked for leave ahead of time.

- *Class Projects:* Students will complete two projects. The first is individual work, the second is in a team of 2-3 students. Students will present project material in class for both projects.

- *Attendance:* Students are expected to attend all lectures during class time (2.5 hours a week). Attendance will be checked each class. Students are allowed to miss up to 4 classes without penalty, after 4 classes are missed then one point from your attendance grade will be deducted each subsequent class until all five points run out. I reserve the right to deduct points also for chronic lateness. If you have an unusual circumstance, please contact me ahead of time to get an approved leave of absence.

- Students are expected to spend a minimum of 6 hours a week on out-of-class/independent learning.

Academic Integrity Code:

Academic Integrity is an integral part of the educational process, and GW takes these matters very seriously. Violations of academic integrity occur when students fail to cite research sources properly, engage in unauthorized collaboration, falsify data, and in other ways outlined in the Code of Academic Integrity. Students accused of academic integrity violations should contact the Office of Academic Integrity to learn more about their rights and options in the process. Outcomes can range from failure of assignment to expulsion from the University, including a transcript notation. The Office of Academic Integrity maintains a permanent record of the violation.

More information is available from the Office of Academic Integrity at www.studentconduct.gwu.edu/code-academic-integrity. The University's "Guide of Academic Integrity in Online Learning Environments" is available at www.studentconduct.gwu.edu/guide-academic-integrity-online-learning-environments. Contact information: rights@gwu.edu or 202-994-6757.

Course Topic Schedule:

This course consists of two parts. During the first part of semester the course focus is on Python programming and during the remaining weeks focus is on R programming. The Python part of the course will give a general introduction to programming, and students will learn and practice introductory programming concepts using the Python programming language. In the R part of the course the tools needed for data analysis, in particular practical issues in statistical computing will be covered.

Course Schedule:

The weekly coverage and number/due dates of homework may change as they depend on the progress of the class. The instructor reserves the right to make changes to this course schedule as necessary.

Week	Software	Content
Week 1 (1/17)	Python Programming	• *Topic(s)*: Introduction and Environment • *Suggested Reading*: *PfDA* Chapter 1 & 2 • *DataCamp*: *Intro to Python* Chapter 1
Week 2 (1/22, 1/24)		• *Topic(s)*: Variable Types and Lists • *Suggested Reading*: *PfDA* Chapter 3.1 • *DataCamp*: *Intro to Python* Chapter 1 & 2
Week 3 (1/29, 1/31)		• *Topic(s)*: Dictionaries, If-Else, For Loops • *Suggested Reading*: *PfDA* Chapter 3.1 & TBD • *DataCamp*: *Intermediate Python* Chapter 2-4
Week 4 (2/5, 2/7)		• *Topic(s)*: While Loops & Breaks. • *Suggested Reading*: TBD • *DataCamp*: *Intermediate Python* Chapter 4 • **HW #1 (Types and Dictionary) Due 2/5**
Week 5 (2/12, 2/14)		• *Topic(s)*: Functions • *Suggested Reading*: *PfDA* Chapter 3.2 • *DataCamp*: *Intro to Python* Chapter 3 • **HW #2 (Loops) Due 2/12**
Week 6 (2/21)		• *Topic(s)*: Functions & Advanced List/Dictionaries
Week 7 (2/26, 2/28)		• *Topic(s)*: Numpy • *Suggested Reading*: *PfDA* Chapter 4 • *DataCamp*: *Intro to Python* Chapter 4 • **HW #3 (Functions) Due 2/26**
Week 8 (3/4, 3/6)		• *Topic(s)*: Matplotlib • *Suggested Reading*: *PfDA* Chapter 9 • *DataCamp*: *Intermediate Python* Chapter 1
Week 9 (3/11, 3/13)		• ***Spring Break***
Week 10 (3/18, 3/20)		• *Topic(s)*: Pandas • *Suggested Reading*: *PfDA* Chapter 5 • *DataCamp*: *Intermediate Python* Chapter 2, *Data Manipulation with pandas*, *Streamlined Data Ingestion with pandas* Chapter 1 • **HW #4 (Numpy and Matplotlib) Due 3/18**
Week 11 (3/25, 3/27)		• *Topic(s)*: Class & Object • *Suggested Reading*: TBD • **Project Presentations & Midterm Project Due 3/27**
Week 12 (4/1, 4/3)	R Programming	• *Topic(s)*: Environment, Vectors, Matrices • *Suggested Reading*: *RiA* Chapter 1 & 2
Week 13 (4/8, 4/10)		• *Topic(s)*: Reading Data, Data Frames, Data Management • *Suggested Reading*: *RiA* Chapter 2 & 4
Week 14 (4/15, 4/17)		• *Topic(s)*: Statistics & Plots • *Suggested Reading*: *RiA* Chapter 3, 6 & 7 • **HW #5 (Types and Data) Due 4/15**
Week 15 (4/22, 4/24)		• *Topic(s)*: Loops & Function • *Suggested Reading*: *RiA* Chapter 5 • **HW #6 (Midterm Project in R) Due 4/24**
Week 16 (4/29, 5/1)		• **Project Presentations & Final Project Due 5/1**

Safety and Security:

- In an emergency: call GWPD 202-994-6111 or 911.

- For situation-specific actions: review the Emergency Response Handbook at `www.safety.gwu.edu/emergency-response-handbook`.

- In an active violence situation: Get Out, Hide Out, or Take Out. See `www.go.gwu.edu/shooterprep`.

- Stay informed: `www.safety.gwu.edu/stay-informed`.

University Policy on Observance of Religious Holidays:

In accordance with University policy, students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance. For details and policy, see "Religious Holidays" at `www.provost.gwu.edu/policies-procedures-and-guidelines`.

Support for Students Outside the Classroom:

Virtual Academic Support

A full range of academic support is offered virtually in Fall 2020. See `https://coronavirus.gwu.edu/top-faqs` for updates. Tutoring and course review sessions are offered through Academic Commons in an online format. See `https://academiccommons.gwu.edu/tutoring`. Writing and research consultations are available online. See `https://academiccommons.gwu.edu/writing-research-help`. Coaching, offered through the Office of Student Success, is available in a virtual format. See `https://studentsuccess.gwu.edu/academic-program-support`. Academic Commons offers several short videos addressing different virtual learning strategies for the unique circumstances of the Fall 2020 semester. See `https://academiccommons.gwu.edu/study-skills`. They also offer a variety of live virtual workshops to equip students with the tools they need to succeed in a virtual environment. See `www.tinyurl.com/gw-virtual-learning`.

Writing Center

GW's Writing Center cultivates confident writers in the University community by facilitating collaborative, critical, and inclusive conversations at all stages of the writing process. Working alongside peer mentors, writers develop strategies to write independently in academic and public settings. Appointments can be booked online. See `https://gwu.mywconline`.

Academic Commons

Academic Commons provides tutoring and other academic support resources to students in many courses. Students can schedule virtual one-on-one appointments or attend virtual drop-in sessions. Students may schedule an appointment, review the tutoring schedule, access other academic support resources, or obtain assistance at `https://academiccommons.gwu.edu`.

Disability Support Services (DSS): 202-994-8250

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services to establish eligibility and to coordinate reasonable accommodations. For additional information see: `www.disabilitysupport.gwu.edu`.

Counseling and Psychological Services : 202-994-5300

GW's Colonial Health Center offers counseling and psychological services, supporting mental health and personal development by collaborating directly with students to overcome challenges and difficulties that may interfere with academic, emotional, and personal success. For additional information see: `www.healthcenter.gwu.edu/counseling-and-psychological-services`.