Statistics 6210 - Fall 2021
Data Analysis
6:10 - 8:40pm Monday, 217 Phillips Hall

Instructor:	Dr. Darcy Steeg Morris
Dept. Office:	Rome Hall, 7th Floor
Office Hours:	after class or by appointment
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Course Description: This course will review statistical principles of data analysis using computerized statistical procedures in R. Topics to be covered include multiple linear regression, analysis of contingency tables and categorical data, logistic regression, generalized linear models, and other traditional statistical methods.

Prerequisite(s): Mathematical statistics (e.g. 4157 or 6201), regression analysis (e.g. 2118 or 6214), and a statistical computing course (e.g. 2183 or equivalent experience).

Required Text (1): *The R Book* by Crawley, 2nd Edition*.
   Viewable online through Gelman Library website (O'Reilly or Wiley Online Library).

Required Text (2): *An Introduction to Statistical Learning with Applications in R* by James, Witten, Hastie & Tibshirani, 2nd Edition, https://www.statlearning.com/.
   Available online: https://web.stanford.edu/~hastie/ISLRv2_website.pdf.
   Videos and notes: https://www.dataschool.io/15-hours-of-expert-machine-learning-videos/.

Reference Text: *An Introduction to Categorical Data Analysis* by Agresti, 2nd Edition*
   Newer Version: 3rd Edition (2018) has R code.

Learning Outcomes: At the completion of this course students will be able to: (1) explore different types of data, (2) formulate a statistical model, (3) perform statistical analysis using statistical packages, and (4) report analysis results.

Grading:

HW Assignments	65%
HW Presentation	5%
Project – Proposal, Presentation and Report	30%

- *Homework Assignments*: Homework will be due every two weeks. Students are expected to write up their own solutions to all assigned problems. If two homework submissions are very similar, students may be questioned about their solutions. Students should use R markdown for homework – this is a great way to integrate code, output and comments into one document. All assignments are equally weighted. Late assignments will not be accepted.

- *Homework Presentation*: On each HW due date, several students will be assigned to present some portion of their homework solutions to the class. The part of the homework to be presented will not be known in advance. Students will be graded on their communication and clarity in addition to the validity of their solution. The assigned order will be alphabetical – the first several students by alphabetical order present on Homework #1, the next several present on Homework #2, etc.

- *Project:* Detailed statistical analysis of a data set. Students will present a brief summary of their data analysis on the last day of class and submit a written report. Project guidelines will be posted and discussed mid-semester.

- Students are expected to attend all lectures during class time (2.5 hours a week) either in-person or virtually.

- Students are expected to spend a minimum of 10 hours a week on out-of-class/independent learning.

Mode of Instruction:

Lectures will be given in-person (as of 8/22/2021) and synchronously streamed online through Blackboard Collaborate Ultra (BBCU) for students who opt to attend virtually. You are expected to attend all lectures in-person or virtually, but lectures will be recorded and posted in case virtual attendees experience technical difficulties and/or internet connectivity issues.

Blackboard:

All students are required to register for the course in Blackboard, the GWU web-based instructional resource. Course information and materials, including homework assignments and grades will be posted there. It is the students responsibility to check the Blackboard website frequently for up-to-date information.

Use of Electronic Course Materials and Class Recordings:

Students are encouraged to use electronic course materials, including recorded class sessions, for private personal use in connection with their academic program of study. Electronic course materials and recorded class sessions should not be shared or used for non-course related purposes unless express permission has been granted by the instructor. Students who impermissibly share any electronic course materials are subject to discipline under the Student Code of Conduct. Please contact the instructor if you have questions regarding what constitutes permissible or impermissible use of electronic course materials and/or recorded class sessions. Please contact Disability Support Services at www.disabilitysupport.gwu.edu if you have questions or need assistance in accessing electronic course materials.

Computing:

We will use R for statistical computing. Please download the R software online at: www.r-project.org and www.rstudio.com.

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 Universitys "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.

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

GWs 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

GWs 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`.

Course Schedule:

Weekly coverage and number/due dates of homework assignments may change depending on the progress of the class. The instructor reserves the right to make changes to this schedule as necessary.

Week	Content
Week 1 (8/30)	• Introduction and R Workshop
Week 2 (9/6)	• *Labor Day (No Class)*
Week 3 (9/13)	• Estimation, Inference and Prediction • **Homework #1 Due**
Week 4 (9/20)	• Model Building and Evaluation
Week 5 (9/27)	• ANOVA and Linear Regression • **Homework #2 Due**
Week 6 (10/4)	• Generalized Linear Models
Week 7 (10/11)	• Logistic Regression for Binary Outcomes • **Homework #3 Due**
Week 8 (10/18)	• Multinomial Regression for Categorical Data
Week 9 (10/25)	• Analysis of Simple Contingency Table Data • **Homework #4 Due**
Week 10 (11/1)	• Loglinear Models for Contingency Tables • **Project Proposal Due**
Week 11 (11/8)	• Poisson Regression for Count Outcomes • **Homework #5 Due**
Week 12 (11/15)	• Analysis of Clustered/Longitudinal Data
Week 13 (11/22)	• Student Voted Topic • **Homework #6 Due**
Week 14 (11/29)	• Review and Office Hours
Week 15 (12/6)	• Project Presentations • **Project Report Due Monday 12/13**