

The George Washington University
Department of Statistics

STAT 2183W: Statistical Computer Packages – Spring 2022

Syllabus

Instructor: Sam Luxenberg

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Lecture Time: Tuesday and Thursday, 9:35-10:50 am

Lecture Location: Bell Hall, Room 109

Office: Rome Hall 734

Office Hours (Virtual): Wednesdays 11:00 am – 12:00 pm or by appointment

Office Hours (In-Person): Thursdays 11:00 am – 12:00 pm

TA: TBD

TA Office Hours: TBD

Course Description

The purpose of this course is to teach the methodology and the skills needed to use the statistical packages R and SAS to analyze data from experiments or surveys. The student is expected to be familiar with the concepts of confidence intervals, hypothesis testing and the central limit theorem. In addition to presenting information on statistical packages, this course will present many new statistical techniques on an applied level.

Topics to be covered include:

A) Parametric Inference

1. Review: one-sample z and t-tests
2. Review: two-sample z and t-tests
3. Categorical data analysis
4. Analysis of variance (one-way and two-way)
5. Tests of independence and goodness of fit
6. One, two, and k-sample test for the variance
7. Regression and correlation (simple and multiple)
8. Analysis of covariance

B) Nonparametric Inference

1. Permutation tests
2. One-sample sign and Wilcoxon tests
3. Two-sample Wilcoxon tests for location
4. Kruskal-Wallis test
5. Friedman test

Bulletin Course Description

Application of program packages (e.g. R, SAS) to the solution of one-, two-, and k-sample parametric and nonparametric statistical problems. Basic concepts in data preparation, modification, analysis and interpretation of results. Includes a significant engagement in writing as a form of critical inquiry and scholarly expression to satisfy the WID requirement.

Prerequisites

An introductory statistics course: STAT 1051, STAT 1053, STAT 111, or equivalent.

Recommended Text

Author	Title	Edition
Ott and Longnecker	An Introduction to Statistical Methods and Data Analysis	7th

Software

R: To download it, go to <https://www.r-project.org/>

It is also recommended to download R-Studio:

<https://www.rstudio.com/products/rstudio/download/>

Learning Outcomes:

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

1. Perform all of the relevant tests from the topics covered, and determine which test is appropriate for any given data set.
2. Perform all of the tests using R and SAS.
3. Write quality statistical reports, detailing the statistical analysis and conclusions.

Average minimum amount of independent, out-of-class, learning expected per week:

Over 15 weeks, students will spend 2.5 hours (150 minutes) per week in lecture. Homework assignments and other out-of-class work is estimated at around 5 hours per week (75 hours for the semester) and includes a 2-hour final exam for which approximately 10 hours of review is assumed.

Grading

- Practice Problem Homework Sets (10%)
- Assignments (40%)
- Midterm Exam (25%)
- Final Exam (25%)

Tentative Class Schedule

Date	Topic(s) Covered	Book Sections
Week 1 (Jan 11, 13)	Review: Confidence Intervals and Hypothesis testing	Sections 5.2, 5.4, 5.6, 5.7
Week 2 (Jan 18, 20)	Introduction to R	N/A
Week 3 (Jan 25, 27)	One-Sample Inference: t-test and sign test	Sections 5.7, 5.9
Week 4 (Feb 1, 3)	Comparing Two-Sample Independent Samples: t-test and Wilcoxon Rank Sum test	Sections 6.2, 6.3, 7.3
Week 5 (Feb 8, 10)	Comparing Two Paired Samples: Paired t-test and Wilcoxon Signed Rank Test	Sections 6.4, 6.5
Week 6 (Feb 15, 17)	Categorical Data Analysis: Chi-Square tests	Sections 10.2-10.5
Week 7 (Feb 22, 24)	One-Way ANOVA: Completely Randomized and Randomized Block Designs	Sections 81.2, 8.2, 8.4, 8.6, some of chapter 9, Sections 15.2, 15.5
Week 8 (Mar 1, 3)	Factorial Experiments: Two-Way ANOVA	Chapter 14
Week 9 (Mar 8, 10)	Review and Midterm (3/10)	
Week 10 (Mar 22, 24)	Simple Linear Regression	Chapter 11
Week 11 (Mar 29, 31)	Multiple Linear Regression	Chapter 12, 13
Week 12 (Apr 5, 7)	Multiple Linear Regression	Chapter 12, 13
Week 13 (Apr 12, 14)	Logistic Regression	12.8
Week 14 (Apr 19, 21)	Miscellaneous	
Week 15 (Apr 26, 28)	Review	
NOTE: In accordance with university policy, the final exam will be given during the final exam period and not the last week of the semester.		

Tentative Assignment Schedule

These written assignments will, on average, be 4-8 pages. There will be a first draft and a final draft for each assignment. The final grade for the assignment will be based on your final draft score.

Written Assignment Topic	1st Draft Due Dates
One-Sample Inference	2/8
Two-Sample Inference	3/1
Chi-Square Tests	3/29
ANOVA	4/26

Tentative Practice Problem Sets Schedule

These practice problem homework sets will be partially graded for accuracy and partially graded for completion. These will require little to no writing (beyond a sentence or two of interpretation of results).

Assignment Topic	Due Dates
Inference Review and Intro to R	1/27
One-Sample Inference	2/3
Two-Sample Inference	2/17
Categorical Data Analysis	2/24
One-Way ANOVA	3/3
Simple Linear Regression	3/31
Multiple Linear Regression	4/14
Logistic Regression	4/21

University policies

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 disabilitysupport.gwu.edu if you have questions or need assistance in accessing electronic course materials.

University policy on observance of religious holidays

Students must notify faculty during the first week of the semester in which they are enrolled in the course, or as early as possible, but no later than three weeks prior to the absence, of their intention to be absent from class on their day(s) of religious observance. If the holiday falls within the first three weeks of class, the student must inform faculty in the first week of the

semester. For details and policy, see “Religious Holidays” at provost.gwu.edu/policies-procedures-and-guidelines.

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 studentconduct.gwu.edu/academic-integrity. The University’s “Guide of Academic Integrity in Online Learning Environments” is available at studentconduct.gwu.edu/guide-academic-integrity-online-learning-environments. Contact information: rights@gwu.edu or 202-994-6757.

Academic support

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 at 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 academiccommons.gwu.edu.

Support for students outside the classroom

Disability Support Services (DSS) 202-994-8250

Any student who may need an accommodation based on the potential impact of a disability should contact Disability Support Services at disabilitysupport.gwu.edu to establish eligibility and to coordinate reasonable accommodations..

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. healthcenter.gwu.edu/counseling-and-psychological-services.

Safety and Security

- In an emergency: call GWPD 202-994-6111 or 911
- For situation-specific actions: review the Emergency Response Handbook at: safety.gwu.edu/emergency-response-handbook
- In an active violence situation: Get Out, Hide Out, or Take Out. See go.gwu.edu/shooterpret
- Stay informed: safety.gwu.edu/stay-informed