

THE GEORGE WASHINGTON UNIVERSITY
Department of Statistics
SYLLABUS

Course: STAT 2183W.10: Statistical Computer Packages
Semester: Spring 2025
Class Time: Monday and Wednesday, 2:20 PM - 3:35 PM EST
Office Hours: Monday, 1:00-2:00 p.m. EST or by appointment.
Location: 1957 E B14
Instructor: Prof. Reza Modarres
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Course Description

The purpose of this course is to teach the methodology and the skills needed to use the statistical packages SAS and R to analyze data from experiments or surveys. The students are 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 tests
 - 6) One, two-sample test for the variance
 - 7) Regression and correlation (simple and multiple)
- B) Nonparametric Inference
 - 1) Permutation tests
 - 2) One-sample sign and Wilcoxon tests
 - 3) Two-sample Wilcoxon test for location
 - 4) Kruskal-Wallis test
 - 5) Friedman test

Principal component analysis and multivariate one sample test of location will be covered if time permits.

Bulletin Course Description: Application of program packages (e.g., SAS, R) 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.

Class Policies: Except for emergencies with proper documentation, there will be no make-up exams. Late projects are given a 10% late penalty for 3 days, after that time a grade of zero is recorded.

Exams: Exams are closed notes and open book.
Lectures will be posted on the Blackboard weekly.

I am available to answer questions during class, after class, during my office hours, by email, and by appointment. If you feel you do not understand a concept or are falling behind, let me know as soon as possible and ask for help.

Prerequisites

An introductory statistics course: Stat 1051, Stat 1053, Stat 1111, or equivalent.

Recommended Text

Author	Title	Edition
Ott and Longnecker	An Introduction to Statistical Methods and Data Analysis	6th

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/>

SAS: To get your own copy of SAS, go to the following site for instructions: <https://itl.gwu.edu/sas-software-distribution>. Alternatively, if you have a Mac, or are unable to download the full version of SAS then you can use SAS University Edition: http://www.sas.com/en_us/software/university-edition.html

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 SAS and R.
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 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

- Assignments (40%)
- Quizzes (10%)
- Midterm Exam (25%)
- Final Exam (25%)

Projects: The programming language that you must use (SAS or R) is stated on each project. Your first attempt of each project is due 10 days after it is first discussed in class. You will receive comments on your approach and write-up. You should use these comments to revise your solution. The hard deadline for each project is given in the course calendar. Your project score is 20% for the first attempt and 80% for the second attempt. You may choose to only submit the final draft for 100%.

Academic Integrity Code

Academic integrity is an essential part of the educational process, and all members of the GW community take these matters very seriously. As the instructor of record for this course, my role is to provide clear expectations and uphold them in all assessments. Violations of academic integrity occur when students fail to cite research sources properly, engage in unauthorized collaboration, falsify data, and otherwise violate the [Code of Academic Integrity](#). If you have any questions about whether particular academic practices or resources are permitted, you should ask me for clarification. If you are reported for an academic integrity violation, you should contact Student Rights and Responsibilities (SRR) to learn more about your rights and options in the process. Consequences can range from failure of assignment to expulsion from the University and may include a transcript notation. For more information, refer to the SRR website at studentconduct.gwu.edu/academic-integrity, email rights@gwu.edu, or call 202-994-6757.

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 provost.gwu.edu/policies-procedures-and-guidelines.

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. Contact the instructor if you have questions regarding what constitutes permissible or impermissible use of electronic course materials and/or recorded class sessions. Contact Disability Support Services at disabilitysupport.gwu.edu if you have questions or need assistance in accessing electronic course materials.

Academic support: Academic Commons

[Academic Commons](#) is the central location for academic support resources for GW students. To schedule a peer tutoring session for a variety of courses visit go.gwu.edu/tutoring. Visit academiccommons.gwu.edu for study skills tips, finding help with research, and connecting with other campus resources. For questions email academiccommons@gwu.edu.

GW Writing Center: GW 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.

Support for students in and 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. Student Health Center 202-994-5300, 24/7. The Student Health Center (SHC) offers [medical](#), [counseling/psychological](#), and [psychiatric](#) services to GW students. More information about the SHC is available at healthcenter.gwu.edu. Students experiencing a medical or mental health emergency on campus

should contact GW Emergency Services at 202-994-6111, or off campus at 911.

GW Campus Emergency Information : GW Emergency Services: 202-994-6111

For situation-specific instructions, refer to [GW's Emergency Procedures guide](#).

GW Alert: GW Alert is an emergency notification system that sends alerts to the GW community. GW requests students, faculty, and staff maintain current contact information by logging on to alert.gwu.edu. Alerts are sent via email, text, social media, and other means, including the Guardian app. The Guardian app is a safety app that allows you to communicate quickly with GW Emergency Services, 911, and other resources. Learn more at safety.gwu.edu.

Protective Actions: GW prescribes four protective actions that can be issued by university officials depending on the type of emergency. All GW community members are expected to follow directions according to the specified protective action. The protective actions are Shelter, Evacuate, Secure, and Lockdown (details below). Learn more at safety.gwu.edu/gw-standard-emergency-statuses.

Shelter: Protection from a specific hazard. The hazard could be a tornado, earthquake, hazardous material spill, or other environmental emergency. Specific safety guidance will be shared on a case-by-case basis.

Action: Follow safety guidance for the hazard.

Evacuate

- Need to move people from one location to another.
- Students and staff should be prepared to follow specific instructions given by first responders and University officials.

Action: Evacuate to a designated location. Leave belongings behind. Follow additional instructions from first responders.

Secure: Threat or hazard outside of buildings or around campus. Increased security, secured building perimeter, increased situational awareness, and restricted access to entry doors.

Action: Go inside and stay inside. Activities inside may continue.

Lockdown: Threat or hazard with the potential to impact individuals inside buildings.

Room-based protocol that requires locking interior doors, turning off lights, and staying out of sight of corridor window.

Action: Locks, lights, out of sight. Consider Run, Hide, Fight

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

Spring Semester 2025

First Day of Classes	Monday, January 13, 2025
Martin Luther King Jr. Day (no classes)	Monday, January 20, 2025
Inauguration Day (no classes)	Monday, January 20, 2025
President's Day (no classes)	Monday, February 17, 2025
Spring Break (no classes)	Monday, March 10–Saturday, March 15, 2025
Last Day of Classes	Monday, April 28, 2025
Make-Up Day	Tuesday, April 29, 2025
Designated Monday	Wednesday, April 30, 2025
Reading Days	Thursday, May 1–Friday, May 2, 2025
Final Examinations	Saturday, May 3–Friday, May 9, 2025

Tentative Class Schedule

Date	Topic(s) covered	Activity
Week 1: Jan 13, 15	Review: Confidence Intervals and Hypothesis testing	Sections 5.2, 5.4, 5.6, 5.7
Week 2: Jan 22, 27	Introduction to SAS and R Discuss P-1	Class Notes
Week 3: Jan 29, Feb. 3	Introduction to SAS and R One Sample Inference: t-test and sign test	Class Notes Sections 5.7, 5.9
Week 4: Feb. 5, 10	Comparing Two Sample Independent Samples: t-test	Sections 6.2, 6.3
Week 5: Feb 12, 19	Wilcoxon Rank Sum test Discuss P-2	Sections 6.2, 6.3 P-1 Due (Feb. 12)
Week 6: Feb 24, 26	Comparing Two Paired Samples: Paired t-test and Wilcoxon Signed Rank Test	Sections 6.4, 6.5
Week 7: Mar. 3, 5	Inferences about Population Variances Quiz 1: Mar 5	Sections 7.1-7.3 P2- Due (Mar. 5)
Week 8: Mar. 17, 19	Categorical Data Analysis: Chi-Square tests Discuss P-3	Sections 10.2-10.5
Week 9: Mar. 24, 26	One Way ANOVA: Completely Randomized and Randomized Block Designs	Sections 8.1, 8.2, 8.4, 8.6, parts of Chapter 9 Sections 15.2, 15.5
Week 10: Mar 31, Apr. 2	Factorial Experiments: Two-Way ANOVA Review for midterm exam	Chapter 14 P-3 Due (Apr. 2)
Week 11: Apr. 7, 9	April 9, Midterm ANOVA	Chapter 14
Week 12: Apr 14, 16	Simple Linear Regression Discuss P-4	Chapter 11
Week 13: Apr 21, 23	Simple Linear Regression Quiz 2 Wed. Apr. 23	Chapter 11
Week 14: Apr. 28, 30	Multiple Linear Regression Review for Final Exam	P-4 Due (Apr 28) Chapter 12, 13
FINAL EXAM		

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