

THE GEORGE WASHINGTON UNIVERSITY

Department of Statistics

STAT 2183W: Statistical Computer Packages

SYLLABUS

Course and Contact Information

Course: STAT 2183W-11 Statistical Computer Packages (CRN: 43175)

Semester: Fall 2023

Meeting time: Tuesday and Thursday, 9:35 – 10:50am

Location: Rome Hall, Room B104

Instructor

Name: Joshua Landon

Campus Address: Rome Hall, Room 756

Phone: 202-994-7851

E-mail: jlandon@gwu.edu

Office hours: 11:00am – 12:30pm on Tuesday and Thursday, and by appointment, either in person or remotely at <https://gwu-edu.zoom.us/j/3217834899>

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 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 tests
 - 6) One, two and k 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

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://library.gwu.edu/sas-statistical-analysis-software>

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 (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

- Assignments (40%)
- Midterm Exam (30%)
- Final Exam (30%)

Assignments: There will be five written assignments. You will be provided with a set of data and will write a statistical report on your analyses.

Exams: All exams will be closed book and notes, but a one-page hand-written “cheat sheet” will be allowed.

Tentative Class Schedule

| Date | Topic(s) covered | Book Sections |
|---|---|---|
| Week 1 | Review: Confidence Intervals and Hypothesis testing | Sections 5.2, 5.4, 5.6, 5.7 |
| Week 2 | Introduction to SAS | N/A |
| Week 3 | One Sample Inference: t-test and sign test | Sections 5.7, 5.9 |
| Week 4 | Comparing Two Sample Independent Samples: t-test and Wilcoxon Rank Sum test | Sections 6.2, 6.3, 7.3 |
| Week 5 | Comparing Two Paired Samples: Paired t-test and Wilcoxon Signed Rank Test | Sections 6.4, 6.5 |
| Week 6 | Categorical Data Analysis: Chi-Square tests | Sections 10.2-10.5 |
| Week 7 | One Way ANOVA: Completely Randomized and Randomized Block Designs | Sections 8.1, 8.2, 8.4, 8.6, some of Chapter 9 Sections 15.2, 15.5 |
| Week 8 | Midterm | |
| Week 9 | Factorial Experiments: Two-Way ANOVA | Chapter 14 |
| Week 10 | Simple Linear Regression | Chapter 11 |
| Week 11 | Multiple Linear Regression | Chapter 12, 13 |
| Week 12 | Multiple Linear Regression | Chapter 12, 13 |
| Week 13 | Logistic Regression | Section 12.8 |
| Week 14 | Miscellaneous | |
| Week 15 | 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 | | |

University policies

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 or not 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 the Office of 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, please refer to the SRR website (<https://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 “Religious Holidays” at 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. 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.

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