

- **Syllabus: Psyc51a-2 Statistics**

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- X. Liu

Syllabus: Psyc51a-2 Statistics

Contact Details

Instructor: Xiaodong Liu

Email: xliu0806@brandeis.edu

Office hours: by appointment through zoom (zoom link will be posted in course web)

TA: TBD

TA office hours: TBD

Course information

Course Format: This is a synchronous remote course, course zoom link will be posted on course website. Students are expected to attend each class on schedule through zoom.

Class Meeting Times: Monday, Tuesday, & Thursday 8:30am - 11:00am

Summer session 1: 6/1/2026 - 7/3/2026

Course website: <https://moodle.brandesi.edu>

Course Description

PSYC 51A is an introductory statistics course that does not assume prior knowledge of statistics or any software (computing platform),

but it does assume the knowledge of basic high school algebra. Basic statistical concepts will be presented in a way that emphasizes practical knowledge, with some theoretical background. The focus will be on statistics as applied in psychology and other behavioral sciences. Psychology, and sciences in general, rely heavily on the use of statistics in empirical research. Understanding statistics has additional practical benefits, as it helps us build a critical and less biased approach to consuming information in our daily lives. R and Rstudio will be the main computing platform in this summer course.

Learning Goals

After successfully completing this course, students are expected to:

- Understand basic statistical concepts and terminology.
- Analyze data using descriptive and inferential statistical methods.
- Interpret statistical results in the context of the research.
- Apply statistical techniques to real-world data.
- Use statistical platform (e.g., R/Rstudio, or JASP) for data analysis.

Teaching/learning strategies

In this course, we will follow the principle of “learning by doing”. Statistical concepts and theories will be introduced through applied examples. Students are expected to review and reinforce the key concepts through re-doing all the examples presented in class and through practices and assignments.

Prerequisites

PSYC 10a or the permission of the instructor.

Credit Hours

This is a four-credit course. Success in this four-credit course is based on the expectation that students will spend the combined total of in-class and outside-of-class work of 36 hours per week for a five-week course (lectures, readings, reviewing, writing). The condensed format of summer semesters means that there will be more work that needs to be done faster in each class week. If you feel that this is NOT your learning style, you should consider taking the course in the Fall or Spring semester.

Course Requirements

Attendance & participation

Students are expected to attend each class synchronously (through zoom). During the class session, you are expected to turn on your video when requested, and you are expected to ask or answer questions. If the class schedule does not fit your summer plan, consider taking another session or taking the course in another semester.

Statistics requires plenty of hands-on experience and practice, and we will be practicing during our class time by completing worksheets and other applied exercises. Submitted worksheets will count towards your final grade (graded for completion). I understand that there may be times when you are unable to make it to class. Please communicate such situations when it happens. You may have two excused absences (with documents if asked) from class, beyond which each additional absence without required document will have one point deduction from your course points.

Assignment

Assignments are planned for most of the classes. You will be expected to submit each assignment on the day before each class (as indicated in the tentative plan and in each assignment), except for the first class, or as otherwise indicated. These assignments will be graded for completion and accuracy, and it will be your responsibility to check the accuracy of your responses. Solutions will be posted on course website.

In addition, we will have three reports. Each report is designed to help you practice the use of R/Rstudio and report your findings in a professional style. We will practice using R/Rstudio in most classes and before each of these reports. Additional resources, if necessary, will be provided to help you complete these reports.

Each report will cover the learning objectives covered in the course so far. The points of each report may be different depending upon the problems asked, but each will be converted into a 100- scale when computing the final course grade. Most report will take the form of a single R Markdown file and a related HTML file (more details in course).

You are expected to complete every assignment and report by the designated deadline: you have to submit all assignments and reports through course website. Late submission of a work without prior permission or appropriate document will get zero credit point for that assignment. You will be allowed to miss two assignments after which each missing or late assignment will get 1.5 points deduction. You will have to submit all three reports.

Exams/Quizzes

We will have three mastery quizzes, which will take place during class time.

In addition, there will be two exams, scheduled for June 22 (Monday, Exam 1) and July 2 (Thursday, Exam 2). These exams will be taken during the class time. The quizzes and exams are all open note/open book.

Missed mastery quizzes: The three mastery quizzes will be completed during class time. If you have to miss the particular class when the quiz is taking place, let me know as soon as you are able to with the appropriate document of your absence. It is your responsibility to contact me for making up the missed quiz as soon as possible. Otherwise, the missed quiz will get zero points.

Missed exams: There will be no makeup exams except with documented medical or family difficulties. In case of a scheduling conflict with another Brandeis summer school course exam, makeup exam has to be approved at least 48 hours before the originally scheduled start time for the exam. It is your responsibility to contact me for making up the missed exam. Otherwise, the missed exam will get zero points.

Evaluation & Grade

Calculation of course grades:

Course attendance and participation: 10% (including submitted worksheets).

Chapter homework assignment: 10% (on time submission and accuracy). Reports: 30% (the three reports will be graded separately and averaged together).

Quizzes: 20% (A single grade for quizzes will be calculated by adding (a) the number of quizzes mastered, and (b) partial credit for quizzes not mastered, based on best score and number attempts).

Exams: 30% (each exam 15%).

There will be no extra credit assignments for this class. The final grade will be calculated using the following formula :

$$\begin{aligned} \text{Final_points} = & .10 * \text{participant} + \\ & .10 * \text{chapter_homework} + .30 * \text{reports} + \\ & .20 * \text{quizzes} + .15 * \text{exam1} \\ & + .15 * \text{exam2} \end{aligned}$$

The course grade will be assigned based on the total points as following:

course.points	letter.grade
95 & above	A
90 < 95	A-
85 to <90	B+
80 to <85	B

course.points	letter.grade
75 to <80	B-
70 to <75	C+
65 to <70	C
60 to <65	C-
<60	NC

Academic Integrity

“Every member of the University community is expected to maintain the highest standards of academic integrity. A student shall not submit work that is falsified or is not the result of the student’s own effort. Infringement of academic honesty by a student subjects that student to serious penalties, which may include failure on the assignment, failure in the course, suspension from the University, or other sanctions (see Section 20). A student who is in doubt regarding standards of academic honesty as they apply to a specific course or assignment should consult the faculty member responsible for that course or assignment before submitting the work. Students may not drop or withdraw from a course while an allegation of academic dishonesty is pending.” ([from the 2025-2026 edition of Rights and Responsibilities](#)).

Please consult Brandeis University Rights and Responsibilities for

all policies and procedures related to academic integrity. When you submit your work through course website, your submitted work may be checked by software or programs to verify originality. Allegations of alleged academic dishonesty will be forwarded to the Department of Student Rights and Community Standards. Citation and research assistance can be found at Brandeis Library Guides - [Citing Sources](#).

Policy on the use of generative AI tools

All work students submit for this course will be their own. In instances when collaborative work is assigned, the assignment should list all team members who participated. Students may use any generative artificial intelligence (AI) tools in this class, if they find that such tool may help their learning and understanding of the course materials. When such AI tools is used while you work on the course assignment and report, appropriate citations and references (e.g. the key words or phrases you used as input for the AI tools) have to be included in your work. Violations of this policy will be considered academic misconduct.

Learning how to use AI tools ethically and responsibly is quite important these days. However, be aware of their limitations and the need to properly cite them in your work. To do so:

- assume that any AI output is the product of its imagination (no

matter how convincing it may seem) and fact-check each argument. Errors and omissions are your responsibility.

To fully acknowledge the use of AI, you shall make sure to:

- first, cite it appropriately. For example, text generated with the help of ChatGPT-4 should be credited using the following format:

ChatGPT-4 (YYYY, Month DD of query). Text of your query.

Generated using OpenAI. <https://chat.openai.com/>.

Content generated using other AI tools should follow a similar citation format.

next, include a paragraph explaining how you used AI, including the full list of your prompts and, if possible and relevant, the AI-generated responses. This can be submitted as a separate document.

In this course, the use of any AI tools in quizzes and exams is not allowed. You may be asked to show the proof of your work for any quiz or exam question where it is appropriate.

We draw your attention to the fact that different classes at Brandeis could implement different AI policies, and it is the student's responsibility to conform to expectations for each course. In the situation where this policy is in conflict with Brandeis University adopted/required policy, we will follow the university policy.

Course Materials

Recommended texts (you may choose one of the following on-line books/materials as your primary reading source):

Illowsky, B & Dean, S. (2026). [Introductory Statistics 2e, OpenStax](#).

* [to read online](#), * [PDF version](#)

OR

Cote, L.R., Gordon, R.G., Randell, C.E., Schmitt, J., & Marvin, H. (2021). [Introduction to Statistics in the Psychological Sciences](#).

OR

Russell, J. M. (2025) [Significant Statistics: An Introduction to Statistics](#) * [link to PDF version](#)

Alternatively, you may get a copy of the following book:

Gravetter, F. J., Wallnau, L. B., Forzano, L.B., Witnauer, J.E. (2021). *Essentials of Statistics for the Behavioral Sciences* (10th ed.). Cengage Learning.

Apps or Tools/Equipment

R (<https://www.r-project.org>) will be the statistical platform for this

course. We will use Rstudio (<https://rstudio.com/products/rstudio/>) for most of our course work. R is free, Rstudio has free version. Details of getting R and RStudio will be given in first class.

Students will need a computer for this course.

Accommodations

“Brandeis seeks to welcome and include all students. If you are a student who needs accommodations as outlined in an accommodations letter, I want to support you. In order to provide test accommodations, I need the letter more than 48 hours in advance. I want to provide students’ accommodations, but cannot do so retroactively. If you have questions about documenting a disability of requesting accommodations, please contact Student Accessibility Support (SAS <https://www.brandeis.edu/accessibility/>) at 781.736.3470 or access@brandeis.edu.”

Student Equipment/Course Supply Needs and Available Support

For those who experience financial challenge to secure the minimal set of hardware, software, and/or course related supplies that are needed to be successful in this course, undergraduate students

should contact [Student Financial Services](#) to discuss options available to purchase equipment and other technology and supply needs.

[The library has short-term laptop loan program](#) if needed. You may also use computers at Goldfarb classroom (PC user) or Farber classroom (Mac user) (see [details here](#)).

Library

“The [Brandeis Library](#) collections and staff offer resources and services to support Brandeis students, faculty and staff. These include workshops, consultations, collaboration, materials and instruction on emerging trends in technologies such as machine learning, emerging trends in research such as data visualization, and emerging trends in scholarship such as open access. Librarians at the Circulation Desk, Research Help Desk, Archives & Special Collections, Sound & Image Media Studios, MakerLab, AutomationLab, and Digital Scholarship Lab are available to help you.”

Other Support

“Brandeis University is committed to supporting all our students so they can thrive. The following resources are available to help with

the many academic and non-academic factors that contribute to student success (finances, health, food supply, housing, mental health counseling, academic advising, physical and social activities, etc.). Please explore the many links on [this Support at Brandeis page](#) to find out more about the resources that Brandeis provides to help you and your classmates to achieve success.”

Names / Pronouns

If you'd like, please feel free to share with me and the class (through the brief self-introduction post in course web) your names and pronouns you prefer to be called. If at some point your name or pronoun changes during the semester, please feel free to let me and the class know also.

Course Plan

The schedule/topic here is subject to change/adjust by the instructor.

Date	Topic	CG.Read	ID.Read	Homework
6/1	Introduction to statistics	CG.1	ID.1	
6/2	The ways to describe the data: graphic	CG.2	ID.2	HW1
6/4	The ways to describe the data: numeric	CG.3	ID.2	HW2
6/8	Z-scores, standardized distribution, & standard normal distribution	CG.4	none	Quiz 1 & HW3
6/9	Probability: basic	CG.5 & 6	ID.3	HW4

Date	Topic	CG.Read	ID.Read	Homework
	concept & Sampling distribution			
6/11	Hypothesis testing, z-statistic and Z-test	CG.7	ID.6 & 7	HW5
6/15	t-statistic and one-sample t-test	CG.8	ID.9 & 8	HW6
6/16	two samples t-test	CG.9 & 10	ID.10	Quiz 2 & Report 1
6/18	Analysis of Variance(A NOVA) I	CG.11	ID.13	HW7
6/22	Exam 1	none	none	

Date	Topic	CG.Read	ID.Read	Homework
6/23	Analysis of Variance(A NOVA) II	CG.11	ID.13	HW8
6/25	Correlation	CG.12	ID.12	Quiz 3 & Report 2
6/29	Linear regression	CG.13	ID.12	HW9
6/30	Categorical data analysis: Chi-square	CG.14	ID.11	HW10
7/2	Exam 2	none	none	Report3