Design and Analysis II

Fall 2025 // PSY 202

Justin Dainer-Best

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Course Number	Time	Location
PSY 202	M/W, 10:10-11:30	RKC 103
PSY 202 Lab A	Th, 9:30-11:30	Albee 100
PSY 202 Lab B	Th, 13:30-15:30	Henderson C.C. 101A

All students will attend class meetings on Mondays and Wednesdays, and their assigned lab on Thursdays (either A or B). Note that the B lab moved this summer and is now in Henderson Computing Center.

Office hours

Make an appointment to come to my office hours. The instructor's office hours are as follows (or by appointment):

- Mondays, 13:00-14:00
- Thursdays, 11:30-13:00

If the posted hours do not work for you, please contact me for alternative times.

> Why go to office hours? Office hours are a great time to **ask questions about material**, to **discuss future directions**, or to talk about your psychology-related interests. You can come to office hours even if you don't have a specific question.

Stats Study Room

Time	Where	Course Assistant
Mondays, 5–7pm	Preston lounge	Kaeyla
Tuesdays, 6–8pm	Preston lounge	Polina

There are two stats study rooms—opportunities for you to consult with a peer tutor about homework, questions around the class, study for exams, or other concerns. You'll receive more information about the stats study rooms once assignments begin.

If you need help outside of the study rooms, or would like a regular individualized meeting with a tutor, you should make use of the Quantitative Literacy program through Bard's Learning Commons, or discuss with me.

Course description

Prerequisites: Intro to Psychological Science, Design and Analysis for Psychology I, and a passing score on part I of the quantitative diagnostic exam. (These requirements may be waived by permission of instructor.)

Wherever possible, I hope to work to make this course accessible and approachable for all students. For more information on accessibility for this course, please view the section on that subject below.

It is your responsibility to check this syllabus, your email, and the Brightspace page, and to stay on-top of assignments.

Overview

In this course, you will be introduced to what happens after designing a study: analysis, graphing, and statistics. We will extensively explore the use (and misuse) of statistics in a data-rich world—focusing largely on conceptualizing and interpreting statistical inferences within psychology. In this course, we will cover basic topics in statistics including: data visualization, measures of central tendency and variability, hypothesis testing, correlation and regression, *t*-tests, analysis of variance, and chi-squared tests. We will also talk about important ways in which statistics are used relating to the real world: thinking about polling, racial bias (and the historical misuse of statistics in this direction), and using statistics for improving outcomes for humans.

Instructor

The instructor for this course is Associate Professor of Psychology Justin Dainer-Best (he/him).

Objectives

By the end of the semester you should...

- understand how we use the concepts of uncertainty and variability to draw inferences about samples
- grasp the logic, strengths, and limitations of the null hypothesis significance testing approach to using statistics to answer psychological questions
- understand the relationship among statistical significance, power, and effect size
- know how to explain these concepts for yourself, and how to apply them in psychological research
- when presented with a research design, be able to identify and conduct the correct statistical analysis in the Jamovi software package, interpret the output of those tests in order to draw a conclusion about research questions, and report the results of statistical analyses in colloquial language and in a manner appropriate for scientific publication
- have a greater understanding of the role of statistics in public discourse.

Materials

Textbook

Primary text: Aron, A., Coups, E. J., & Aron, E. N. (2013). *Statistics for psychology.* (6th ed.) Boston: Pearson. ISBN 0205258158

We will be using a textbook that has been used in previous years, which I believe provides a strong theoretical background. I will provide explicit links between class and the textbook. However, the textbook *does not use Jamovi*, and as such we will diverge from it in some ways. The most recent version of the textbook is the *seventh* edition (Aron, Coups, Aron, & Cooley; ISBN-13 9780137994496). However, I am comfortable with you using any recent edition. Do not buy the workbook (unless you'd like to practice with it); that is not what you need. Do consider searching for used/online copies. This need not be an expensive purchase (especially if you buy the 6^{th} or even 5^{th} edition), and if it appears to be such please check with me. (If you cannot afford the textbook, and need a physical copy, you may also fill out this form to be loaned a textbook from the SM&C division.)

You should complete each reading *in preparation for class*, as listed below on the schedule. You should not upload slides or readings to AI tools. Doing so gives materials created by me or the authors to such AI tools without our agreement.

> **Note**
>
> Some students find the textbook very helpful, especially when read in advance of class. Others prefer to read after lectures, or when preparing for exams. Others never read the textbook. I am okay with any of these patterns (although I think most students benefit by at least somtimes reading the textbook); choose what works for you to make sure you're learning the concepts.

Other resources

You may also find that outside resources are useful to you, and there are a lot of stats resources on the web. Make use of them. You may wish to watch videos from Khan Academy or 3blue1brown, for example. Further, here are a few additional textbooks that I've seen recommended (please note that these are *suggestions*; you need not buy any).

- Navarro, D. J. & Foxcroft, D. R. (2025, 2022, 2020). *Learning statistics with Jamovi: A tutorial for beginners in statistical analysis*. Cambride, UK: Open Book Publishers. https://doi.org/10.24384/hgc3-7p15
- Poldrack, R. A. (2024, 2018). *Statistical thinking for the 21st century*. https://statsthinking21.org

The Bard Psychology Program has decided to teach this course in Jamovi across sections, to provide overlap from semester to semester. If you are interested in learning to use R, Python, or other statistical programming languages or software, please come discuss in office hours, or consider taking the relevant courses from the data analytics second focus.

Jamovi

You will be using the software Jamovi in this class. It should be available on the lab computers in your lab, but it is free and you are welcome to install it on your own personal machine. If you cannot do so or would prefer to use computer lab computers, you may be in touch with me and we can make sure it is installed in your lab. Jamovi will also work through a Cloud service on e.g. a Chromebook (Jamovi Cloud), but this is sometimes difficult and I recommend installing to your computer if possible.

Install Jamovi from https://www.jamovi.org/download.html. You will eventually read an introduction to Jamovi from the Navarro & Foxcroft textbook mentioned above.

Class Policies

Attendance

Because of the nature of the material, absences will likely incur a de facto penalty on exams: it is difficult to do well on tests without having attended class. We will move at a rapid pace; material that is missed due to absence will not be repeated in class or office hours. However, this is a college class and you are an adult; your attendance is your decision. Late arrivals can be disruptive to the class. Consistent patterns of lateness are unfair to other students. Please be on time.

If you are not feeling well, please do not come to class. If you have recently been ill, please wear a mask when you attend; masks are effective at reducing spread of many respiratory illnesses. Each of us shares responsibility for the health and safety of all in the classroom.

Accommodations & Accessibility

Bard College is committed to providing equal access to all students. If you anticipate issues related to the format or requirements of this course, please contact me so that we can arrange to discuss. I would like us to discuss ways to ensure your full participation in the course. Together we can plan how best to support your learning and coordinate your accommodations. Students who have already been approved to receive academic accommodations through disability services should share their accommodation letter with me and make arrangements to meet as soon as possible.

If you have a learning difference or disability that may relate to your ability to fully participate in this class, but have not yet met with the Disability Support Coordinator at Bard, you can contact their office through https://www.bard.edu/accessibility/students/; the Coordinator will confidentially discuss the process to establish reasonable accommodations. Please note that accommodations are not retroactive, and thus you should begin this process as soon as possible if you believe you will need them.

I will include alt-text for images and optimize slides for students with color-blindness or difficulty seeing. I am also happy to help you explore ways for making Jamovi or other materials more accessible for you.

Additionally, as my office in Preston Hall may be physically difficult to access, you may always request to meet with me in another location. I am available for meetings online as well as those in person.

Diversity, Equity, & Inclusion

It is important to me that this course provides an open and supportive learning environment for all students. I invite you to speak with me if you have concerns or questions regarding issues of belonging, safety, or equity in the classroom. I want our discussions to be respectful of all students. If I am not helping the classroom to feel like an inclusive environment, I invite you to provide me with [anonymous] feedback. I will collect feedback in a variety of ways throughout the semester; I also invite you to provide additional feedback as you find necessary. Different forms of knowledge can be valuable in a psychology classroom. In this class, we will engage with material that is statistical in nature but will use examples from across psychology; your insights are always welcome.

Plagiarism and Academic Integrity

I expect you to be familiar with what plagiarism is and is not. You may not present someone else's work as your own without proper citation. You should be writing for this course in English using the statistical language we discuss. Using AI-generated text is not a replacement for your own writing, and automated or "AI" tools to edit grammar and spelling should be used sparingly. You may not copy someone else's work. You may not simply reword text from another source without giving credit, or ask generative textbots to do so. Please cite others' work where relevant, and use your own writing. If you are not sure about the definition of plagiarism, or whether something constitutes plagiarism, please consult with me or with someone at Bard's Learning Commons. Students caught plagiarizing will be reported to the Academic Judiciary Board, will get no credit for the assignment, and may fail the course.

However, please note that I *do* encourage you to work *with your classmates* during this course. While some assignments are to be completed independently, other assignments should be worked on collaboratively. Homework assignments may be worked on with peers, **provided that you credit your study group** (or the stats study room you took part in). The statistics project and lab assignments should always be worked on with classmates. Study groups are an excellent way to learn material. However, you should take care to ensure that you can respond to the questions independently. (And please note that simply answering the questions is not enough; you should always show your work. If you get the answer another way, please take the time to understand why it is that way while doing the homework, so you can use that understanding during exams/etc.)

I operate from the standpoint that you are interested in learning this material, and are doing your best to operate with integrity. Using LLMs or text generators like chatGPT take away your ability to learn from the process of writing, while also increasing your likelihood of generating "slop" (see, e.g., Willison, 2024; OUP, 2024). That said, there is doubtless a place for LLMs in this class—as a digital tutor, as a coach and question-asker, etc. However, an over-reliance on chatGPT and its ilk will detract from your learning and make assessments much more difficult. Do your best to learn from the assignments in this class.

I expect you to cite sources that you use, including tools that reword your writing like Grammarly, tutors who help you rework a homework or paper, or if you use chatGPT or similar tools to understand a complex topic.

Cell phones and laptops

Before class, you should silence your cell phone, and you should not be on your phone during class unless you are asked to be (e.g., to respond to a poll). I do not recommend taking notes on your phone as a rule. In our Monday and Wednesday classes, especially regarding statistics, I recommend taking notes on paper wherever possible. Creating equations on a laptop may take excessive amounts of time. If you text or access materials unrelated to class during our class time, you are mentally absent from class. Additionally, browsing unrelated materials is distracting to you and also to your classmates.

When using an electronic device during class, I encourage you to turn off notifications or to turn on Do Not Disturb whenever possible.

Late Assignments

The homework assignments, class reports, and lab project can be turned in **within two days** of their due dates without penalty. For example, if a homework assignment is due before class on a Wednesday, it may be turned in by Friday at midnight without penalty. Assignments may still be turned in after this late date, up until completion week. However, such assignments may not receive full credit (see section Grading below, especially regarding missing assignments). If your work is consistently turned in late, this also may impact your grade unless you discuss this lateness with me.

Assignments

Homework

Homework for each chapter will be due after we complete a particular topic, as indicated on the schedule. You may choose to write your homework by hand and turn it in during class, or to turn it in online (via scans or by completing it on your computer). Late assignments completed on paper must be turned in on Brightspace if they are not handed to me directly, although the paper version can be dropped off at my office after you do so.

Homework assignments will be scored based on completion and whether they are on-time—I do not grade homework assignments, but do provide answers and will discuss commonly incorrect answers. Wrong answers are acceptable so long as you have tried to the best of your ability. Where there are multiple variants of the same question (e.g., find the mean of two ranges), it is

your choice whether you complete all variants. The homework provides options to practice applying the techniques; they are not primarily an assessment.

See the section on grading principles for more information.

Class reports

Following major topics—instead of a quiz—you will turn in a class report, in which you respond to the following items:

1. Summarize what you believe to be the most important points (and, where relevant, equations) relating to the concepts discussed since the last report—referring to specific components from class
2. Identify any questions you still have about these topics/concepts—explain what the concept is, and why you still have questions
3. Comment on the lab and homework assignments you have completed: where did you succeed or struggle?

    - This is a good part to ask questions, or to ask me to spend time discussing something in class; this might be a very short section if all you have to say is "I understand all of this"

4. Identify what is exciting or interesting about the material, and why
5. Apply the statistical methods we have been discussing to a psychological question that you develop

    - For example, you might give an example of a psychological experiment where a z-test (see the schedule, below) could be used to draw conclusions about the results.

Class reports are usually about one single-spaced page; here is a template in google docs. (But you can also do it in any kind of document.)

Following the first class report, I will provide examples of "satisfactory" and "exemplary" class reports. (See the section on grading principles below.)

Exams

Exams provide the opportunity for you to demonstrate your understanding of course materials. You may not make up exams (except in the case of unanticipated emergencies *with documentation* from the Dean of Students).

Each exam will be in class on the date indicated on your syllabus.

Exams will be focused on material covered in the Monday/Wednesday classes. Lab material will be assessed by the lab exam and statistics project. In-class exams are "closed-book" except

that you may also bring a $3'' \times 5''$ index card with notes to the first exam, and an $8.5'' \times 11''$ sheet of paper with notes to the second exam.

Lab work

Most week's labs (see the schedule) will include a portion to be turned in to demonstrate completion of that task. This work can be turned in before the next lab if not completed in the lab period.

Lab Exam

There are two components of the lab exam. First, you will complete a closed-book hand-written assessment of your knowledge of Jamovi. Then, you will complete a brief project using Jamovi to conduct a statistical analysis. The latter portion is open everything-but-another-person-or-AI (you may use notes, a search engine, Jamovi help, your textbook, etc.). This project is designed to allow you to demonstrate that you understand how to use the techniques we learn in lab, and to apply it to the questions asked in class.

The goals of this and the stats project, below, are as follows:

- *Help you to practice the skills learned in lab.* While there will be weekly lab assignments, the lab projects give you an opportunity to explore the skills you are developing, use Jamovi, and analyze real data.
- *Prepare you for research classes and senior project.* Many students take advanced methodology courses in the psychology program and complete research projects for their senior project. This experience helps prepare you for analyzing data.
- *Introduce you to the experience of adapting techniques.* Most questions that you will ask in these projects will be corollaries of those asked in preceding labs. Your project will thus involve editing and reusing techniques you have already learned.

Further details will be provided with the assignment.

Statistics project

In your stats project, you will perform a data analysis on *real data*, using the skills you've developed in the labs. This group-based project is a semester-summarizing version of the lab exam—you will develop research questions, demonstrate your usage of Jamovi, create visualizations, carry out analyses, and produce a final document that reports all of them. Further details will be provided mid-semester, likely before Thanksgiving.

All students should plan to be involved in the group project, which will include a final presentation of the analyses.

Grades

Assignment	Points
Homework	10
Class Reports	15
Exams	30
Lab Work	15
Lab Exam	15
Statistics Project	15
Total	**100**

Grade	Range
A-range	90-100
B-range	80-89
C-range	70-79
D-range	60-69
F	below 60

Your grades in this course will come from the assignments described above: **lab work**, a **lab exam**, a **stats project**, regular **homework** assignments and **class reports**, and two **exams**.

There are a lot of assignments in this course—this means (a) that there is a lot of room to succeed and learn the material, and (b) that there are many things for you to keep track of. (Don't forget the schedule!)

My role as your professor is first and foremost to help you learn to use the skills of statistical analysis—not to give you grades. Most students can get a B in this course by putting in the work to sufficiently complete all assignments, on-time. (Plus and minus grades will be assigned at the top/bottom of each grade range.) Most students who fail to succeed at this class do so because they don't turn in their assignments.

How does this work?

Grading principles

On-time assignments can receive full scores

As described in the Section on Late Assignments above, late assignments can be turned in up to two days late without penalty. (Think of the due date as a "due date window.") **Missed assignments** are those that are not turned in by the late due date. These assignments will by definition receive below the full score, as detailed below.

Homework assignments are graded on completion only

I will collect your homework assignments, and you will receive credit for whether they are completed. You will score your own homework; I will provide detailed correct answers. This sort of self-assessment is important in fully understanding the material—not just looking at a score, but determining yourself which answers were correct. I will frequently choose one question to review in class (chosen in part based on your class reports), and will provide class-wide feedback on this material if necessary. Answering questions wrong on the homework assignments will not result in a lower score, but I *do* expect you to make honest attempts at all questions—and to ask for help from me or in Stats Study Rooms if you are unsure about the answers. Homework will receive half-credit if late, and no credit at all if not turned in.

Class reports are graded on a 3-point scale

All class reports will receive 2 points (sufficient) if turned in on-time and complete. Late class reports, or those without all required sections, will receive 1 point (incomplete). To receive the full 3 points, class reports must be **thoughtful**, provide **novel connections to psychological research and to class content**, and be turned in on-time (or within the normal late window).

Lab grades come from three sources

Lab assignments are assessed collaboratively; lab grades will come from the assignments, the lab exam, and the lab project. You should attend lab to learn the skills and complete assignments, which are graded for completion.

The lab exam will receive points from both the written and project portions; highest scores will be given to students with accurate written responses and excellent projects showing both clear analysis steps and visualization. The final statistics project will be graded collaboratively; students will complete a rubric for grading themselves, which I will use as a jumping-off point for my own grading.

Exams are graded for both correct answers and correct techniques

I grade exams holistically, and consider both other sections of your exam as well as your classmates'. For example, if you carry the wrong answer from one part through the next part of a question correctly, you will receive credit for all subsequent parts.

Exams are opportunities to show that you understand the statistical concepts of this course; students are not penalized heavily for incorrect basic math.

Schedule

The schedule will change over the course of the semester. In particular, while exam dates should not shift, homework and class reports will be assigned as we complete topics, and I will add links to Brightspace in the table below. You are responsible for keeping up with the readings, showing up to class prepared, and turning in assignments on-time.

Chapters refer to the textbook. I give the entire chapter when the topic is introduced, but you may read it whenever works for you.

Day	Date	Topic	Reading	Due
Monday	Sep 01	Statistics		
Wednesday	Sep 03	Statistical Concepts	Ch. 1	
Lab (Thursday)	*Sep 04*	*Intro to Jamovi*	*Foxcroft & Navarro (2025), Ch. 3*	
Monday	Sep 08	Central Tendency and Variability	Ch. 2	
Wednesday	Sep 10	z-scores and probability	Ch. 3	01 Basics class report
Lab (Thursday)	*Sep 11*	*Jamovi exercises*		
Monday	Sep 15	Estimating unknown quantities from a sample		
Wednesday	Sep 17	Hypothesis Testing	Ch. 4	HW 1
Lab (Thursday)	*Sep 18*	*Hypothesis Testing*		
Monday	Sep 22	Hypothesis Testing		
Wednesday	Sep 24	Testing Hypotheses with Means of Samples	Ch. 5	
Lab (Thursday)	*Sep 25*	*Visual Displays of Information*		

Monday	Sep 29	Visualizing Data		02 Hypothesis testing class report
Wednesday	Oct 01	*t*-test for a single sample	Ch. 7	HW 2
Lab (Thursday)	*Oct 02*	*t-test for a single sample*		
Monday	Oct 06	*t*-test for independent means	Ch. 8	
Wednesday	Oct 08	*t*-test for independent means		
Lab (Thursday)	*Oct 09*	*t-test for independent means*		*03 t-tests class report*
Monday	Oct 13	Fall break (no class)		
Wednesday	Oct 15	*t*-test for dependent means		HW 3
Lab (Thursday)	*Oct 16*	*Lab Exam*		*Lab Exam*
Monday	Oct 20	Exam 1		Exam 1
Wednesday	Oct 22	Type I and Type II errors; Effect Size	Ch. 6	
Lab (Thursday)	*Oct 23*	*t-test for dependent means; Error*		
Monday	Oct 27	Statistical Power, Confidence Intervals, and Uncertainty		
Wednesday	Oct 29	One-way ANOVA	Ch. 9	
Lab (Thursday)	*Oct 30*	*One-way ANOVA*		
Monday	Nov 03	ANOVA; Correlation and Regression	Ch. 11	04 ANOVA class report
Wednesday	Nov 05	Correlation and Regression		
Lab (Thursday)	*Nov 06*	*Correlation and Regression*		*HW 4*
Monday	Nov 10	Factorial ANOVA and Interactions	Ch. 10	
Wednesday	Nov 12	Factorial ANOVA and Interactions		
Lab (Thursday)	*Nov 13*	*Factorial ANOVA; project planning*		*05 Factorial ANOVA class report*
Monday	Nov 17	When assumptions fail		
Wednesday	Nov 19	Bayesian Statistics		
Lab (Thursday)	*Nov 20*	*Project Workday*		
Monday	Nov 24	Bayesian Statistics		
Wednesday	Nov 26	No class		

Lab (Thursday)	*Nov 27*	*Thanksgiving (no lab)*		
Monday	Dec 01	Chi Square	Ch. 13	
Wednesday	Dec 03	Applications of Statistics		HW 5; Bayesian stats class report
Lab (Thursday)	*Dec 04*	*Project Presentations; Chi-square*		*Statistics project*
Monday	Dec 08	Exam 2		Exam 2
Wednesday	Dec 10	Advising Day (no class)		
Lab (Thursday)	*Dec 11*	*Psychology Boards (no class)*		
Monday	Dec 15	Completion Days		
Wednesday	Dec 17	Completion Days		
Lab (Thursday)	*Dec 18*	*Completion Days*		