

# Design and Analysis II

PSY 202

Justin Dainer-Best

Spring 2024

Course Number	Time	Location
PSY 202	M/W, 10:10-11:30	Hegeman 102
PSY 202 Lab A	Th, 9:30-11:30	Henderson 101A
PSY 202 Lab B	Th, 13:30-15:30	Henderson 101A

All students will attend class meetings on Mondays and Wednesdays, and their assigned lab on Thursdays (either A or B).

## Office hours

The instructor's office hours are as follows:

- Mondays, 11:30-12:00
- Wednesdays, 11:30-13:15
- Thursdays, 11:30-12:30

You should plan to make an appointment where possible: [Make an appointment](#). 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, 5:30-7:30pm	Preston lounge	Elene
Wednesdays, 5-7pm	Preston lounge	Olivia

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.

## Course description

Prerequisites: PSY 141 or PSY 128, PSY 201, 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 Assistant 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
- 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., Aron, E., & Coups, E. J. (2012). *Statistics for psychology*. (5th ed.) Upper Saddle River, NJ: Pearson/Prentice-Hall. ISBN 0136010571.

We will be using the same 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 5<sup>th</sup> 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](#).

### 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](#), 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. (2022, 2020). *Learning statistics with Jamovi: A tutorial for psychology students and other beginners*. Version 0.75. <https://doi.org/10.24384/hgc3-7p15>
- Poldrack, R. (2018, 2019). *Statistical thinking for the 21st century*. <https://statsthatthinking21.org>
- Wheelan, C. (2014). *Naked statistics: Stripping the dread from the data*. New York: Norton.

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.

## 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 in beta.

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 sick, or have a cough, please consider wearing a mask. 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.

Wherever possible, I will aim to 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 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. Using AI-generated text is not a replacement for your own writing, and using text produced by a generative system is not acceptable practice for final documents. Similarly, you may not copy someone else's work. You may not simply

reword text from another source without giving credit. 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 quizzes and some assignments including the solo project 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 group 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 quizzes/exams/etc.)

I operate from the standpoint that you are interested in learning this material, and are doing your best to operate with integrity.

## 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 and lab projects 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.

Quizzes must be completed during the window in which they are assigned. (Although you may be able to complete quizzes on Brightspace after the deadline, those grades do not count.) You do not need to complete every quiz in order to get full points for the quizzes. That said, repeatedly missing quizzes will impact your grade.

## 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. Wrong answers are acceptable so long as you have tried to the best of your ability. See below for more information.

### Brightspace quizzes

There will be quizzes on Brightspace for most topics. Your top quizzes will be incorporated to create the final quiz score; the lowest scores on two quizzes will be dropped, and the remaining quizzes will be averaged. Quizzes must be taken by **midnight two days after the topic** is covered that has a quiz in the schedule below. I will remind you when quizzes must be taken.

All quizzes are open-book and comprised of questions randomly selected from a larger set of questions (so each student will have a different quiz). You may not collaborate or ask for help on these quizzes (see Plagiarism, above).

### Exams

Exams are a good time 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 solo and group projects. In-class exams are “closed-book” except that you may also bring a 3" × 5" index card with notes to the first exam, and an 8.5" × 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 late if not completed in the lab period.

## Solo Project

The solo project is a lab-based project and is open everything-but-another-person-or-AI (you may use notes, a search engine, Jamovi help, your textbook, etc.). You will be assigned the project during the lab period and complete it over the course of that period and the following week. 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 group 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.

## Group project

In your group project, you will perform a data analysis on *real data*, using the skills you've developed in the labs. This group project is a semester-summarizing version of the solo project—you will develop research questions, create visualizations, carry out analyses, and produce a final document that reports all of them. Further details will be provided later in the semester.

## Grades

Assignment	Points
Homework	10
Quizzes	20
Exams	30
Lab Work	10
Solo Project	10
Group Project	20
<b>Total</b>	<b>100</b>

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 solo **lab project**, a **group project**, regular **homework** assignments, **online quizzes**, 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. That means that 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

**Missed assignments will not 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 self-graded.**

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. I will occasionally choose one question to review, 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 missing, and no credit at all if not turned in.

### **Lab grades come from the projects.**

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

The solo project will receive most points for completion, with highest scores being received for excellence in their use of analysis steps and visualization. The group project will be graded collaboratively; students will complete a rubric for grading themselves.

### **Quizzes are graded automatically through Brightspace.**

Quizzes are scored at 5 points each (usually five questions). After dropping the two lowest quiz scores (or missing quizzes), the remaining quizzes will be averaged.

## **Schedule**

The schedule may change over the course of the semester. Changes to assignment dates will be announced via email and also changed on the course website. 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.

<b>Day</b>	<b>Date</b>	<b>Topic</b>	<b>Reading</b>	<b>Due</b>
Monday	Jan 29	Statistics		
Wednesday	Jan 31	Statistical Concepts	Ch. 1	Quiz 1
Lab (Thursday)	Feb 01	Intro to Jamovi	<a href="#">Foxcroft &amp; Navarro (2022), Ch. 3</a>	
Monday	Feb 05	Central Tendency and Variability	Ch. 2	Quiz 2
Wednesday	Feb 07	z-scores and probability	Ch. 3	
Lab (Thursday)	Feb 08	Jamovi exercises		
Monday	Feb 12	Estimating unknown quantities from a sample		Quiz 3
Wednesday	Feb 14	Hypothesis Testing	Ch. 4	Quiz 4

<b>Day</b>	<b>Date</b>	<b>Topic</b>	<b>Reading</b>	<b>Due</b>
Lab (Thursday)	Feb 15	Visual Displays of Information		
Monday	Feb 19	Hypothesis Testing	Ch. 4	
Wednesday	Feb 21	Testing Hypotheses with Means of Samples	Ch. 5	Quiz 5
Lab (Thursday)	Feb 22	Hypothesis testing		
Monday	Feb 26	Visualizing Data		
Wednesday	Feb 28	t-test for a single sample	Ch. 7	Quiz 6
Lab (Thursday)	Feb 29	t-test for a single sample		
Monday	Mar 04	t-test for independent means		
Wednesday	Mar 06	t-test for independent means	Ch. 8	Quiz 7
Lab (Thursday)	Mar 07	t-test for dependent and independent means		
Monday	Mar 11	t-test for dependent means		
Wednesday	Mar 13	Exam 1		
Lab (Thursday)	Mar 14	Solo project		
Monday	Mar 18	Spring break (no class)		
Wednesday	Mar 20	Spring break (no class)		
Lab (Thursday)	Mar 21	Spring break (no class)		Solo project
Monday	Mar 25	Type I and Type II errors; Effect Size	Ch. 6	Quiz 8
Wednesday	Mar 27	Statistical Power, Confidence Intervals, and Uncertainty	Ch. 9	
Lab (Thursday)	Mar 28	One-way ANOVA		
Monday	Apr 01	One-way ANOVA		Quiz 9
Wednesday	Apr 03	Correlation and Regression	Ch. 11	
Lab (Thursday)	Apr 04	Correlation and Regression		
Monday	Apr 08	Correlation and Regression	Ch. 12	
Wednesday	Apr 10	Factorial ANOVA and Interactions		
Lab (Thursday)	Apr 11	Factorial ANOVA and Group Project		Quiz 10
Monday	Apr 15	Factorial ANOVA and Interactions		

<b>Day</b>	<b>Date</b>	<b>Topic</b>	<b>Reading</b>	<b>Due</b>
Wednesday	Apr 17	When assumptions fail; Bayesian Statistics		
Lab (Thursday)	Apr 18	Project Workday		
Monday	Apr 22	Bayesian Statistics		
Wednesday	Apr 24	Chi Square	Ch. 13	
Lab (Thursday)	Apr 25	Chi Square; Project Workday		Quiz 12
Monday	Apr 29	Advising Day (no class)		
Wednesday	May 01	Applications of Statistics		
Lab (Thursday)	May 02	Project Workday		
Monday	May 06	Review for Exam		
Wednesday	May 08	Board Week (no class)		
Lab (Thursday)	May 09	Board Week (no class)		
Monday	May 13	Board Week (no class)		
Wednesday	May 15	Exam 2		
Lab (Thursday)	May 16	Completion Days		Final projects
Monday	May 20	Completion Days		