

# Syllabus

**San José State University**

**Department of Psychology**

**STAT 245: Advanced Statistics (Seminar)**

**Section 1, Fall 2021**

Last updated: August 18, 2021

## Instructor Contact Information

Instructor: David Schuster, Ph.D.

Office Location: DMH 315

Telephone: 408-924-5659

Email: david.schuster@sjsu.edu

Office Hours: 4:00-5:00pm Tuesdays and Thursdays; I am also available for in-person and Zoom appointments

## Course Information

Classroom: DMH 359

Class Days/Time: Tues. & Thurs., 10:30am – 11:45am

Prerequisites: STAT 115 or equivalent

## Welcome!

My name is Dr. David Schuster, and you are welcome to call me ‘Dave,’ ‘David,’ or ‘Dr. Schuster.’ My preferred pronouns are he/him/his. I have been teaching since 2008 and a professor at SJSU since 2013. I earned my Ph.D. in psychology from the University of Central Florida. I am looking forward to being your instructor as you develop your research and statistics skills in our course. I am also working to anticipate and minimize disruption to our class (some of which may be beyond our control) while prioritizing our health and safety. I will keep you updated should any changes become necessary, and I appreciate your patience as we navigate these challenges.

## Course Description

This seminar is designed to train graduate students to critically select, use, interpret, and communicate the results of statistical analysis in psychological research. While reviewing fundamentals of descriptive and inferential statistics, we will cover advanced topics in the use of statistics for research, such as: The

General Linear Model, factorial ANOVA, simple effects tests, power, effect size, and statistical conclusion validity. The course will emphasize discussion of current issues affecting the practice of science, especially those associated with replicability, publishing, and implications for social justice. Students will be trained to run analyses using the R language.

From the catalog: Advanced problems in statistical analysis. Advanced consideration of hypothesis testing, estimation and analysis of variance.

## **Course Format**

This is a technology intensive seminar. Required technology is described in the required materials section of this document.

## **Learning Outcomes**

### **Program Learning Outcomes**

Upon successful completion of the requirements for the MA in Research and Experimental Psychology, students will be able to:

#### **Goal 1. Knowledge Base**

Students completing the MA in Psychology program will understand the major theoretical perspectives and research methods across areas of experimental psychology, i.e., Developmental, Social, Cognitive, and Physiological.

- PLO 1.1 – Understand the major theoretical perspectives and research methods across areas of experimental psychology, i.e., Developmental, Social, Cognitive, and Physiological.

#### **Goal 2. Research Methods & Scholarship**

Graduates of our program will possess an advanced level of competence in research methods, statistical techniques, and technical writing skills. Students completing the MA in Psychology program are required to complete a thesis. The thesis will:

- \*PLO 2.1 – demonstrate creative problem-solving in the design, implementation of empirical research.
- PLO 2.2 – demonstrate project management skills in the implementation of empirical research.
- \*PLO 2.3 – demonstrate advanced competency in the statistical analysis and interpretation of empirical research findings.
- \*PLO 2.4 – be able to communicate (oral and written) their research findings at a professional level.

#### **Goal 3. Career Enhancement**

Graduates of our program will experience career enhancement through placement in a doctoral program or acceptance of a position requiring a master's in psychology in the public or private sector. Students completing the MA in Psychology program will:

- PLO 3.1 – achieve career enhancement through placement in a doctoral program or acceptance of a position requiring a master’s in psychology in the public or private sector.
- STAT 245 contributes to PLOs 2.1, 2.3, and 2.4.

## Course Learning Outcomes

The goals of this course are to help you: build a solid conceptual understanding of statistics in research, develop the practical skills necessary to apply statistics to research, and become a self-directed learner.

Upon successful completion of this course, you will be able to:

- CLO 1: Explain which statistical procedure(s) are appropriate for a given research situation
- CLO 2: Conduct and interpret statistical analyses, including mixed factorial designs
- CLO 3: Communicate results of statistical analysis in APA style
- CLO 4: Discuss systemic issues affecting the practice of science and suggest solutions

The learning objectives will be assessed via written assignments.

## Required Materials

### Canvas and E-Mail

All graded assignments will be accepted in electronic form using the Canvas learning management system assignments page (Canvas is available at <https://sjsu.instructure.com/>). Communication regarding the course will be posted to Canvas or sent via the e-mail address linked to your MySJSU account. It is your responsibility to make sure you are enrolled in Canvas and receiving my emails.

### Required Texts/Readings

Schuster, D., Navarro, D., Crump, M. J. C., & Suzuki, J. (2020). Advanced Statistics Remix.

The required text is freely available on my web site.

Required supplementary course material will be made available on Canvas.

The following book is recommended for use electronically in the SJSU library. You do not need to purchase it:

Cohen, B. H. (2013). Explaining psychological statistics (4th ed.). Hoboken, NJ: John Wiley & Sons. ISBN: 978-1118436608

### Computer

A laptop or tablet computer with Internet access will be necessary to participate in class activities and for your use outside of class. In lieu of a computer or tablet, a smartphone may be used but is unlikely to provide a good experience. You will need a keyboard. If you do not have a laptop or tablet computer available for this course, please meet with me to discuss free options for computer resources.

We may occasionally hold meetings and activities via Zoom. A webcam and microphone are recommended but not required. For your security, I recommend that you disable and cover your webcam when not in use.

## Virtual Lab Environment

This course will require use of many software packages, including R, Excel, Word, and SPSS. I will provide instruction in the use of the software; you do not need to start the course with this knowledge.

You will be provided with access to a virtual lab environment with this software already installed. Instructions to access the virtual lab are available on Canvas. If you prefer, these software packages are also available to you at no cost for use on your own computer:

- RStudio
- R
- SPSS
- Adobe Creative Cloud
- Microsoft Office
- Google Drive

## Grading Policy

### Determination of Grades

Grades will be available to you on Canvas throughout the semester. Grades are assigned based on your final point total out of 1000 points for the course:

Grade	Points
A plus	> 965 points
A	916 to 965 points
A minus	896 to 915 points
B plus	866 to 895 points
B	816 to 865 points
B minus	796 to 815 points
C plus	766 to 795 points
C	716 to 765 points
C minus	696 to 715 points
D plus	666 to 695 points
D	616 to 665 points
D minus	595 to 615 points
F	< 595 points

### Rounding is Included in the Grading Scale

The point totals reflect rounding up to the nearest percentage. For example, an A- would normally require 900 points (or 90% of 1000 points). With rounding, it only requires 896 points (or 89.6% of 1000 points). Because rounding is built into the grading scale, your grade will be based on your final point total, rounded to the nearest whole point (so, 895.6 points is an A-, but 895.4 points is a B+). To be fair to everyone in the class, these are firm cutoffs.

# Course Requirements and Assignments

## Engagement Activities

**Engagement activities are prerequisites for completing weekly assignments. Engagement activities do not directly impact your final grade.**

For each course module, several engagement activities will be posted to Canvas. Engagement activities are designed to help you build your knowledge and practice your skills without any consequences for failure. For example, one engagement activity might involve attending a class discussion and writing a short reflection. Engagement points are awarded for activity completion; engagement points are not worth any grade points. However, you need 100 engagement points in the current module in order for your weekly assignment to be graded. Therefore, I encourage you to complete engagement activities first before attempting the weekly assignment.

## Weekly Assignments

**Weekly assignments are 90% of your final grade (900 points total).**

One graded assignment will be posted to Canvas most weeks worth approximately 75 points. The weekly assignment is an assessment of the knowledge and skills you have developed through engagement activities. Most assignments will have multiple parts and will require analysis of a novel data set and write up. All submitted assignments must use APA style, but no manuscript formatting is necessary unless stated (e.g., you do *not* need to include a title page, abstract, etc.).

Each graded assignment will be scored as satisfactory/credit or unsatisfactory/no credit. An assignment labeled satisfactory/credit will earn full points. An assignment labeled unsatisfactory/no credit may be revised and resubmitted without penalty. You will receive feedback for any unsatisfactory/no credit assignment. A rubric for assignment grading will be posted to Canvas.

You may discuss your weekly assignment with your classmates but you must perform your own analyses and do your own writing. When you submit a weekly assignment, you are claiming it as your own writing and analysis. If you use words or ideas from other sources, they must be quoted or cited. SJSU has a 15-minute, online plagiarism tutorial that is worthwhile as a refresher of this important issue of academic integrity.

One course meeting each week will be dedicated to discussion and work on your current assignment.

## Applied Project

**The applied project is 10% of your final grade (100 points total).**

As part of the applied project, you will conduct an analysis of an existing dataset. The complete applied project will include an abstract, introduction, methods section, results, and discussion. Drafts of each component will be completed as part of the weekly assignments throughout the course. You will present your applied project during the final exam period. A rubric with more complete instructions will be posted on Canvas, but because this assignment is completed over a series of milestone assignments throughout the semester, it is anticipated that successful completion of all requirements of the project, including the presentation, will earn full points. Your final applied project must be compiled into one document and submitted separately to earn credit.

## Resubmission, Make-ups, and Grading Process

### **You can resubmit graded assignments without penalty.**

Any assignment that receives a grade of unsatisfactory/no credit may be revised and resubmitted. Assignments may be submitted at any time until 11:59pm on the last day of instruction for the semester. At that time, all unsubmitted and unsatisfactory/no credit assignments will receive zero points. Should an event prevent you from completing the course, contact me as soon as you are able to discuss our options for an incomplete.

### **We will work together on make-ups of scheduled activities.**

Class activities that are scheduled, such as an article discussion, cannot be recreated easily. If you miss a scheduled class activity, one option is to forgo the engagement points for that activity and earn them in other activities available for that week. Depending on the specifics of your situation, that may or may not be a good solution. If it is not, let me know and I will work with you to make up a missed scheduled activity by suggesting an alternative assignment. If I become concerned about excessive use of this option, I will discuss it with you. Finally, this is not an appropriate mechanism for extended absences from class; if you anticipate being absent from class, contact me as soon as you become aware of it.

For all other class activities, no makeup policy is needed.

### **I will grade your assignments in order.**

- You may submit assignments in any order and at any time before the end of instruction. However:
  - Because of the grading policy and scheduling of some class activities, you are strongly encouraged to work on the course material in order, as scheduled, and to submit assignments in order with enough time for them to be graded and resubmitted. The grading criteria for assignments will be the same regardless of whether the assignment is turned in early or near the end of the semester.
  - Because engagement activities are preparation for the weekly assignment, you are strongly encouraged to do the engagement activities before starting the assignment.
- I will only grade your weekly assignment once you have required number of engagement points as stated on Canvas.
- I will only grade the first weekly assignment you have not yet completed.
- I will provide you with timely grades and feedback. I will catch up on grading at a minimum of once per week but likely more frequently.

An example of might help:

Imagine you work ahead and do all the engagement activities for Week 1 and Week 2. Then, you complete and submit the weekly assignment for Week 2, skipping Week 1. I see your submission, but I do not start grading it until you submit your assignment for Week 1. Next, imagine you then receive *no credit* for your Week 1 submission. You would need to revise, resubmit, and earn credit for your Week 1 assignment before I would grade Week 2. Imagining you got credit on your second attempt for Week 1's assignment, I would then grade your Week 2 assignment automatically.

As this example shows, the course offers some flexibility but will work best if you complete the coursework in order.

**You might ‘fail’ an assignment or a few; that is normal.**

The reality of this course structure is that you may receive no credit/unsatisfactory weekly assignment grades from time to time. This might be a novel or uncomfortable experience for you as a graduate student, because: (1) you probably earned high grades in college, and (2) college has norms where low grades are ‘bad.’ *I encourage you to challenge this unhelpful mindset.* This is a course designed for you to ‘fail’ quickly, learn, and succeed. This structure is similar to your thesis, which also involves a process of trying, getting feedback, revising, and moving forward.

**Track your progress frequently.**

I am available to discuss your progress in the course at any time. To help you plan for your grade, you are encouraged to enter your scores in my progress report tool available on my web site.

## **Final examination or evaluation**

Faculty members are required to have a culminating activity for their courses, which can include a final examination, a final research paper or project, a final creative work or performance, a final portfolio of work, or other appropriate assignment.

The final evaluation in this course will be the applied project presentation.

## **Classroom Environment**

We agree to:

- **Mutual respect**, which means that we recognize and value that we bring different skills, experiences, and qualities to our course, and we act with regard for how our behavior affects others. As much as we can, we recognize and accommodate individual constraints that impact our work. Some ways we will show mutual respect include:
  - Affirming that intolerance, including racism, sexism, xenophobia, transphobia, and homophobia will not be acceptable in the physical and digital spaces that make up our course.
  - Respecting our and others’ intellectual property. For students, this includes not sharing or posting copyrighted class materials. For instructors, this includes seeking permission before sharing or posting student work (unless for an educational purpose, checking for or responding to academic dishonesty, or due to legal action). Your work may be sent to turnitin.com and processed through search engines to detect plagiarism. However, I will not allow turnitin.com to store your work in their repository.
  - We understand that we have multiple obligations and limited time. Our meetings will start promptly at times convenient for both of us.
  - We understand that we are all doing our best as we face our own challenges. I will expect that you put in reasonable effort on your assignments. You can expect patience and help whenever you struggle with course material. And, I am always available to meet with you should life events impact your progress in the course or success in your program.
- **Academic and professional integrity**, which means that the credibility of science and education depends on us acting ethically. Ethical violations by us or our collaborators can jeopardize our research and harm our reputation as researchers. We also know that we cannot act ethically if we do not understand what that means for researchers. Therefore, it is important that research ethics are part of your learning in this class. You can expect support and guidance when you navigate and speak up

on challenging ethical situations. You can also expect no tolerance of ethical or academic integrity violations that negatively affect our class or community, including cheating and plagiarism. You can expect your instructor to follow all University policies and protocols regarding the handling of suspected academic dishonesty. Penalties can include failure of the course.

- **Unlimited support** related to the class or your professional training and development. This means that there is no limit to the number of questions you may ask, e-mails you may send, and no restriction on the hours you can spend in meetings with me. You need never apologize for asking a question or seeking support. Time is limited but support is not; if the volume of student meetings were to become unmanageable, I will make adjustments to help all students more efficiently (for example, by answering a common question to the whole class). I am always happy to help you.
- **Incorporation of issues of social justice.** It is my goal to help prepare you to tackle the major societal challenges we face, including COVID-19 and broader issues of equity and sustainability. Success against these challenges requires equitable participation by people of diverse backgrounds and experiences. To support this goal, this course will incorporate discussion of social justice when relevant to the course and support your evaluation of how our discipline has/can/will address social justice, as well as how it has contributed to social injustice.

## University Policies

Per University Policy S16-9, relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on Syllabus Information web page. Make sure to visit this page to review and be aware of these university policies and resources.

You must obtain the instructor's permission to make any audio or video recordings in this class.

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

## Course Schedule

The course schedule is tentative and likely to change; modifications will be posted to this page.

Week	Date	Topics	Weekly assignments
1	Thu., Aug. 22	Introduction	
2	Tue., Aug. 27	Research design, casual inference, and the role of statistics	Assignment 1
	Thu., Aug. 29		
3	Tue., Sep. 3	Introducing R	Assignment 2
	Thu., Sep. 5		
4	Tue., Sep. 10	Individual student meetings; descriptive statistics	
	Thu., Sep. 12		
5	Tue., Sep. 17	Inferential statistics: The Central Limit Theorem	Assignment 4
	Thu., Sep. 19		
6	Tue., Sep. 24	Hypothesis testing: Power and effect size	Assignment 5
	Thu., Sep. 26		
7	Tue., Oct. 1	Practical issues in hypothesis testing	Assignment 6
	Thu., Oct. 3		



Week	Date	Topics	Weekly assignments
8	Tue., Oct. 8 Thu., Oct. 10	Data cleaning and missing values analysis	Assignment 7
9	Tue., Oct. 15 Thu., Oct. 17	The general linear model (GLM)	Assignment 8
10	Tue., Oct. 22 Thu., Oct. 24	More on multiple regression	Assignment 9
11	Tue., Oct. 29 Thu., Oct. 31	One-way ANOVA	Assignment 10
12	Tue., Nov. 5 Thu., Nov. 7	Multiple comparisons	Assignment 11
13	Tue., Nov. 12 Thu., Nov. 14	Factorial ANOVA	Assignment 12
14	Tue., Nov. 19 Thu., Nov. 21	Factorial ANOVA	
15	Tue., Nov. 26 Thu., Nov. 28	Writing workshop / Individual student meetings Thanksgiving, No class meeting (Thu.)	
16	Tue., Dec. 3 Thu., Dec. 5	Publishing, meta-analysis, and open science	
Final	Mon., Dec. 16	Project presentations	