

# Syllabus

**San José State University**

**Department of Psychology**

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

**Section 1, Fall 2022**

Last updated: August 17, 2022

## **Instructor Contact Information**

Instructor: David Schuster, Ph.D.

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Office Hours: 4:00-4:30pm Tuesdays and Thursdays; also available by appointment

## **Course Information**

Classroom: WSQ 113

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.

## **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. We will learn to run statistical analysis using the R language.

The catalog description of this course is: Advanced problems in statistical analysis. Advanced consideration of hypothesis testing, estimation and analysis of variance.

## **Course Format**

This is a technology intensive, in-person 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
- G\*Power
- 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

## Weekly Assignments

**Weekly assignments are 70% of your final grade (70 points total).**

One graded assignment will be posted to Canvas most weeks worth 70 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 weekly assignment will be scored according to the rubric on Canvas. Any weekly assignment not earning full credit may be revised and resubmitted without penalty.

You are encouraged to discuss your weekly assignment with your classmates, but you must perform your own analyses and do your own writing. When you submit any written assignment in this course, 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.

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

## Project Milestone Assignments

**The project milestone assignments are 20% of your final grade (200 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 six project milestone assignments. Each milestone assignment will be worth 33 or 35 points.

Milestone assignments will be scored according to the rubric on Canvas. Any project milestone assignment not earning full credit may be revised and resubmitted without penalty.

## Applied Project Presentation

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

You will present your applied project during the final exam period. A rubric with more complete instructions will be posted on Canvas. 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 and Extensions Make-ups, and Grading Process

**You can request an extension.**

Assignments not submitted by the due date posted on Canvas will be assigned a grade of zero unless you complete **this form** to request an extension or makeup of the assignment. When you need an extension, please complete this form as soon as you can.

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

Weekly reflection and project milestone assignments may be resubmitted at any time until 11:59pm on the last day of instruction for the semester. At that time, all unsubmitted 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. Please allow one week for grading submitted assignments. Plagiarized work cannot be resubmitted.

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

Class activities that are scheduled, such as a guest speaker, cannot be recreated easily. If you need a makeup assignment (e.g., you will miss the talk needed to complete an assignment, or even if you were navigating life events and could not focus on the talk), please contact me. I will work with you to create an alternative assignment. There is no need to pretend you attended an activity that you missed.

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

The reality of this course structure is that you may receive 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 and research career, which also involve a process of trying, getting feedback, revising, and moving forward.

### **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, qualities, and identities 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 ableism, classism, racism, sexism, transphobia, heterosexism, and xenophobia 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 me, this includes seeking permission before publicly sharing or posting your 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 and 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  | Assignments  |
|------|--------------------------------|---|--------------|
| 1    | Tue., Aug. 23<br>Thu., Aug. 25 | Research design, casual inference, and statistics | Assignment 1 |

| Week  | Date                               | Topics  | Assignments                  |
|-------|------------------------------------|---|------------------------------|
| 2     | Tue., Aug. 30<br>Thu., Sep. 1      | Analysis using R and R Studio   | Assignment 2                 |
| 3     | Tue., Sep. 6<br>Thu., Sep. 8       | Guest speaker: Elizabeth Shallal, Mozilla<br>Descriptive statistics                     |                              |
| 4     | Tue., Sep. 13<br>Thu., Sep. 15     | Inferential statistics: The Central Limit Theorem                                       | Assignment 3                 |
| 5     | Tue., Sep. 20<br>Thu., Sep. 22     | Hypothesis testing: Power and effect size   | Assignment 4                 |
| 6     | Tue., Sep. 27<br><br>Thu., Sep. 29 | Practical issues in hypothesis testing  | Assignment 5,<br>Milestone 1 |
| 7     | Tue., Oct. 4<br>Thu., Oct. 6       | HFES Conference Week, <b>No Class Meetings</b>  |                              |
| 8     | Tue., Oct. 11<br><br>Thu., Oct. 13 | Data cleaning and missing values analysis   | Assignment 6,<br>Milestone 2 |
| 9     | Tue., Oct. 18<br>Thu., Oct. 20     | The general linear model (GLM)  | Assignment 7                 |
| 10    | Tue., Oct. 25<br><br>Thu., Oct. 27 | More on multiple regression   | Assignment 8,<br>Milestone 3 |
| 11    | Tue., Nov. 1<br>Thu., Nov. 3       | One-way ANOVA   | Milestone 4                  |
| 12    | Tue., Nov. 8<br><br>Thu., Nov. 10  | Multiple comparisons  | Assignment 9,<br>Milestone 5 |
| 13    | Tue., Nov. 15<br>Thu., Nov. 17     | Factorial ANOVA   | Assignment 10                |
| 14    | Tue., Nov. 22<br>Thu., Nov. 24     | Writing workshop / Individual student meetings<br>Thanksgiving, No class meeting (Thu.) |                              |
| 15    | Tue., Nov. 29<br>Thu., Dec. 1      | Factorial ANOVA   | Milestone 6                  |
| 16    | Tue., Dec. 6                       | Last day of instruction, assignment submission ends<br>11:59 pm                         |                              |
| Final | Mon., Dec. 12                      | Project presentations, 9:45am - 12:00pm   |                              |