

EDUC 6050  
**Applied Statistical Analysis**

Wednesday 4:30 – 7:15 pm

Room: HPER 114a

**Instructor**

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Office Hours: W 3:00 – 4:15

Office: EDUC 435

## Course Purpose

This course is an applied introduction to statistical methods commonly used in educational, social, and health sciences. Coverage of data types, data base creation, data exploration and visualization; use of statistical software to compute descriptive and inferential statistics, including correlation, regression, group comparisons (t-tests, ANOVA), and categorical methods.

### Essential Questions for this Course

- What is quantitative research?
- How does data inform our world?
- How are data analyzed?

## Course Structure

This is a lecture and applied skills course. Students will be expected to demonstrate their learning via *classroom participation*, *assignments*, and *examinations*. The purpose of class lectures is to elaborate on interesting or difficult material presented in the text, conduct skill-building exercises and demonstrations, and to provide a forum for discussion.

## Required Materials

- Carlson, K.A. and Winquist, J.R. (2017). *An Introduction to Statistics: An Active Learning Approach* (2<sup>nd</sup> Ed.). Sage Publications.
- **Canvas** ([my.usu.edu](https://my.usu.edu)) Please check Canvas frequently for course updates, assignments, & grades.
- **Jamovi** software (free and open source; similar to SPSS; downloading and installing are discussed in class)
- Scientific or statistical **calculator** (may be a graphic calculator, but NOT a cell phone, iPod, tablet, etc.)

*Note: it is advantageous to bring a laptop to class, but not required.*

## Preparation & Attendance

You should make every attempt to be at every class session. The activities, discussions, and demonstrations are designed to be helpful and insightful. Furthermore, the class lectures and activities will be absolutely essential for you to meet the requirements of some of the assignments in this course. However, as human beings, we sometimes get sick or have extenuating circumstances. If possible, make arrangements to obtain information covered in the course.

You are expected to participate in class activities and discussions. Research demonstrates that the quality of the classroom environment depends on the interaction of the students and the teacher. This class will be highly interactive and discussion-based. I believe if you give the effort to learn the material, you can gain analytic skills that will benefit you throughout your life.

Finally, you are expected to read all course material and have become familiar with course assignments. This preparation will make class time valuable and productive; otherwise, class assignments and examinations will be more difficult and time consuming.

## Four Components of Your Grade

### **I. Statistics Organizer, 20% of grade**

It is important that you read the material **PRIOR** to the designated lecture, as well as read through the associated homework assignment. By so doing, this ensures class time may be more valuably spent on answering questions and preparing you for assignments. To facilitate this, a Statistics Organizer is required. This contains information regarding: statistical procedure, appropriate circumstances for use, assumptions of the statistical test, key statistics and their meaning, important notes or variations. You need to develop this organizer early and keep up with it through the semester. You will turn in the organizer at certain points throughout the semester.

Because students are able to use their notes on examinations (explained below), this is not only your statistics cheat sheet for life but also for exams.

Each student must compose his or her own. Statistics Organizers must NOT be a copy of the lecture notes. It can be in any electronic format (.docx, .pptx, .html, etc.), although it is best if the document is a PDF when you print it.

### **II. Research Portfolio, 20% of grade**

An important aspect of this course is discovering how statistics are used in your field. You must find a minimum of **TEN** journal articles in your field with a quantitative component (look for numbers). Create a grid (in Excel or Word) that states the author, year, journal, major research questions, the major constructs (IV or DV), the different statistical methods, and brief summary of findings. Finally, write a roughly two-paragraph response to each article on how the statistical information provided an insight into the research questions (in other words, what did we learn within these studies that we didn't already know?). In addition, near the end of the semester we will have you share some of the more interesting articles that you found with the class.

### **III. Assignments, 30% of grade**

**SIX** equally weighted assignments form the basis for learning the practice of statistics at the level required by this course. These assignments are based on analyzing data in Jamovi (or SPSS if you prefer). These use data that you collect (via a survey that we develop the first day of class) or any other data source that you are interested in.

All assignments are **REQUIRED**: NO scores will be dropped. Students may work together, however each student must turn in his or her own work, **not photocopies or identical replicates**. Assignments are due by **11:59pm** on the due date (see course schedule). Details on what is required to be turned in will be posted on canvas. Half of the points are earned for **completion** and half for **correctness** (based on a subset of problems chosen for grading). Skipped portions of an assignment may result in loss of points for **BOTH** completeness **AND** correctness. Late assignments turned in within 24 hours of the due date will receive **half** the score earned. No points will be awarded thereafter.

### **IV. Examinations, 30% of grade**

**TWO** equally weighted examinations will be given during this course. Examinations will be given **IN CLASS** and will require **less than 60 minutes**. Examinations will cover material discussed in class **AND** in the readings. All formulas needed will be provided on examinations (unless noted during examination reviews). Applicable statistical tables will also be provided where necessary. Calculators may be used, but not any electronic device that may transmit/receive, such as cell phones, iPods, tables, etc.

Both of the exams are **REQUIRED**: NO scores will be dropped. Examinations may consist of definitions, multiple choice questions, computations, output interpretations, and short-answer essays. You may use your own printed **statistical organizer, homework, and other notes** during examinations. Only **60 minutes** will be given, so be prepared.

Please make every effort not to miss examinations as they cannot be rescheduled unless there is documented evidence for the reason of absence (e.g., serious illness, accident, court). In the event of an emergency the student must contact the instructor immediately and BEFORE the examination.

\*NOTE: Final is comprehensive but it will focus much more heavily on topics covered after the mid-term.

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### Grading Criteria

The standard grade breakdown used by Utah State University will be followed to assign the student a letter grade. The final percentage will be determined by dividing the student's total points earned by the total number of possible points:

A 93-100%	B+ 87-89%	C+ 77-79%	
A- 90-92%	B 83-86%	C 73-76%	D 60-69%
	B- 80-82%	C- 70-72%	F < 60%

### Advice for Success

Many of you will learn to appreciate, and may even develop a deep interest in, statistical analysis over the course of our semester together. I hope that you do as the skills you will acquire in this course will benefit you in many ways. You will see that statistical methods are tools in the social scientist's toolkit, which will help you to better interpret and understand the applied research of your given field and will be of great value to you in conducting your own research.

However, I understand that many of you are concerned about any math required in the course. Although statistics is a branch of mathematics, in this applied course we keep the level of mathematics to a bare minimum. So, please do not let a fear of mathematics prevent you from excelling in this course. Some of you may also fear work on the computer. The practice of modern statistics relies almost exclusively on computer software. We utilize a new, free software that simplifies the use of the computer in statistics known as Jamovi. If you are familiar with Excel or any other spreadsheet service, Jamovi will be fairly natural to start using. In addition to Jamovi, we will use some basic spreadsheet tools (Excel or Google Sheets will work great) to do some of the data work for us. Ultimately, this class is not a mathematics or a computer programming class but rather it is focused on helping you appreciate the basics of quantitative research so that you can best use it in your respective careers.

A final word of warning: **Beware of technology misbehaving near deadlines.** All assignments are to be turned in before the strict deadlines. Additionally, most assignments require some use of Jamovi or other software to complete them. It is never reliable to count on technology to come through at the last minute.

### Jamovi

In this course, we will use Jamovi for the computation. It is a blend between Microsoft Excel and IBM's SPSS. The reason this software was chosen for this class is because:

1. It is free.
2. It is based on using a spreadsheet (which most of us are at least familiar with).
3. It is simplified so that only the analyses that you'll be learning about are shown.
4. It has the ability to reproducibly and succinctly run any analyses that you will be needing throughout your research and/or analytic career.

Jamovi can be downloaded from <https://www.jamovi.org/>. Again, it is free and works on PC, Mac, and Linux systems.

### Selected Policies & Procedures

#### Changes in Assignments and Schedule

The instructor reserves the right to make changes to this syllabus at any time. Changes will be announced in class and posted on Canvas.

#### Students Needing Assistance with the English Language

Several assignments in this course require English composition. If you feel you need assistance, please visit the USU Writing Center. They have tutors available to help: <http://writingcenter.usu.edu>.

#### Academic Integrity - "The Honor System"

Each student has the right and duty to pursue his or her academic experience free of dishonesty. The Honor System is designed to establish the higher level of conduct expected and required of all Utah State University students.

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The Honor Pledge: To enhance the learning environment at Utah State University and to develop student academic integrity, each student agrees to the following Honor Pledge: "I pledge, on my honor, to conduct myself with the foremost level of academic integrity." A student who lives by the Honor Pledge is a student who does more than not cheat, falsify, or plagiarize. A student who lives by the Honor Pledge:

- Espouses academic integrity as an underlying and essential principle of the Utah State University community;
- Understands that each act of academic dishonesty devalues every degree that is awarded by this institution;
- Is a welcomed and valued member of Utah State University.

### Plagiarism

Plagiarism includes knowingly "representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials." The penalties for plagiarism are severe. They include warning or reprimand, grade adjustment, probation, suspension, expulsion, withholding of transcripts, denial or revocation of degrees, and referral to psychological counseling.

### Sexual Harassment

Sexual harassment is defined by the Affirmative Action/Equal Employment Opportunity Commission as any "unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature." If you feel you are a victim of sexual harassment, you may talk to or file a complaint with the Affirmative Action/Equal Employment Opportunity Office located in Old Main, Room 161, or call the AA/EEO Office at 797-1266

### Students with Disabilities

Qualified students with disabilities may be eligible for reasonable accommodations. If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center (797-2444 voice, 797-0740 TTY, or toll free at 1-800-259-2966; Room 101 of the University Inn), preferably during the first week of the course. Any request for special consideration relating to attendance, pedagogy, taking of examinations, etc., must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative format, large print, audio, diskette, or Braille."

### Withdrawal Policy and "I" Grade Policy

Students are required to complete all courses for which they are registered by the end of the semester. In some cases, a student may be unable to complete all of the coursework because of extenuating circumstances, but not due to poor performance or to retain financial aid. In such cases an 'I' will be submitted as the grade for the semester. The term 'extenuating' circumstances includes:

- (1) incapacitating illness which prevents a student from attending classes for a minimum period of two weeks,
- (2) a death in the immediate family,
- (3) financial responsibilities requiring a student to alter a work schedule to secure employment,
- (4) change in work schedule as required by an employer, or
- (5) other emergencies deemed appropriate by the instructor.

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Date	Readings and Such	Lecture Topic	Week	Assignment Due by 11:59pm
Jan 10		Syllabus, Textbook, data, and create your survey	1	
Jan 17	<a href="http://r4ds.had.co.nz/tidy-data.html#introduction-6">http://r4ds.had.co.nz/tidy-data.html#introduction-6</a> (ignore the R code)	Working with and Analyzing Data, Overview of Statistics, Intro to Statistics Terminology, Introduction to Jamovi	2	
Jan 24	Ch 1, 2, 3 Start looking for published research in your area	Statistics terminology (Hypothesis, IV and DV, Measurement, Validity and Reliability, Correlation and Experimentation, Distributions, Central Tendency and Variability)	3	
Jan 31	Ch 4, 5, 6	Statistics terminology continued (hypothesis testing, populations and samples, descriptive and inferential statistics, effect sizes, confidence intervals, Type I and II errors)	4	Statistics Organizer #1
Feb 7	Ch 7	More on Jamovi (data manipulation, transformations, assumptions), Creating tables and figures for reports and manuscripts, Intro to t-tests	5	HW #1 (Central Tendency and Variability)
Feb 14	Ch 7, 9, 10	T-tests (student's, Mann-Whitney, Wilcoxon), Review of hypothesis tests	6	
Feb 21	Ch 11, 12	ANOVA (one-way, two-way), ANCOVA, Repeated Measures ANOVA, post-hoc analyses	7	HW #2 (t-tests) Statistics Organizer #2
Feb 28		Mid-Term Examination	8	HW #3 (ANOVA)
Mar 7	Spring Break!			
Mar 14	Ch 13	Correlations (Pearson, Spearman, partial)	9	
Mar 21	Ch 13	Linear Regression (hypothesis testing, prediction, assumptions)	10	
Mar 28	Ch 13	Multiple Regression (moderation, mediation)	11	HW #4 (correlations, regression)
April 4	Ch 14	Categorical Data Analysis (Chi-square, logistic, log-linear, odds ratios)	12	HW #5 (multiple regression) Statistics Organizer #3
April 11	Ch 14	Categorical Data Analysis continued (logistic, odds ratios)	13	
April 18		Research Portfolio, Review for final	14	HW #6 (categorical data)
April 25		Review (get ready for the final)	15	Statistics Organizer #4
May 2		Final Examination		