

Educational Psychology 721  
Descriptive and Inferential Statistics: An Introduction  
Fall

Instructor:  
Office:  
Office Phone:  
Office Hours:  
e-mail:

#### Text

Hinkle, D.E., Wiersma, W., & Jurs, S.G. (2002). Applied statistics for the behavioral sciences, fifth edition. Boston: Houghton Mifflin.

#### Materials

Calculators: You will need one. A basic calculator will do as long as it includes a square rootkey.

#### Course Description

- The purpose of this course is to provide basic knowledge of statistical principles and software (i.e., SPSS).
- We cover two types of statistics: Descriptive and inferential.
  - Descriptive statistics include measures of central tendency and variability based on the normal distribution.
  - Inferential statistics are used to make inferences from a sample to population based on a sampling distribution of means.
- The main emphasis is on practical use of statistics when reading and interpreting research.
- Please note that we will not have time in one semester to cover everything.
- We will focus as much time as possible on the most important material (see the chapter-by-chapter list of important concepts below).
- Mastering this material will enable you to learn additional material in the book (e.g., non-parametric statistics) on your own.

#### Class Format

- This class covers a challenging topic, but we are fortunate to meet face-to-face.
- Normally, I will provide a brief reflection/ Q&A time at the beginning of the course followed by a class lecture and some time for practical application/practice.
- Assignments and quizzes will be handled in the WebCampus portion of our course. Make sure you are able to log onto WebCampus. IT WebCampus support is available 7 days a week from 7AM to 11PM. See: <https://wchelp.unlv.edu/students/home>
- It is also critical that you check your UNLV Rebel Mail weekly, as I may occasionally post announcements via email.

#### Accessing SPSS

- One-half of your grade is based on homework assignments using the statistical software package SPSS (Statistical Package for the Social Sciences).
- You have three options.
  - One is to contact SPSS through the link provided and buy a student version, which you can download ([www.spss.com](http://www.spss.com)).
  - A second option is to buy the student package on google (where prices vary, but usually are cheaper than buying from SPSS).
  - A third option is to use a computer at UNLV for free. There are a number of locations, including the Business College, Lied Library, Bean Engineering, and Moyer Union. Please note that SPSS has a free trial offer, but the time frame is short, and you do not get all of the programs.

Each computer assignment will have five questions except HW 6 (i.e., confidence intervals). Send a copy of your SPSS printout and brief answers to the questions to the assignment dropbox. Please submit your homework assignments to the assignment drop box as word documents with graphs, tables, and figures pasted into them.

### Accessing Helpful Websites

There are many websites that provide free statistics tutorials. Go to [www.google.com](http://www.google.com) and use “statistics tutorials” or other key words to snoop around. If you discover a good website, please notify me so I can share the address with other students.

### Evaluation

Course point allocations will be as follows:

- Quiz 1: 30 points
- Quiz 2 assignment: 50 points
- Eight computer assignments: 10 points each (80 points total)
- Total = 160 points

### Quizzes

- Quiz 1 will include approximately 25 4-option multiple choice questions regarding main concepts such as the mean, variance, and standard deviation worth 1.2 points each.
  - Quiz 1 will also include computational problems that you can do by hand.
  - Once you begin Quiz 1 you will have 6 hours to complete it.
- Quiz 2 will be an applied assignment utilizing what was covered during class.
  - Once Quiz 2 becomes available you have until the due date to complete it.
- You may use the book, notes, and calculators for homework assignments and quizzes.
- You will have plenty of time to complete the exam.
  - If you have an emergency on quiz day, email me immediately. You must make up the quiz within 48 hours.

Quiz 1 will open on Tuesday, October 18<sup>th</sup> at 3PM and will close on Sunday, October 23<sup>rd</sup> at 11:00PM.

Quiz 2 will open on Sunday, December 4<sup>th</sup> at 3PM and will close on Sunday, December 10<sup>th</sup> at 11:00PM.

### Homework Assignments

- You will complete eight assignments for this course, which must be completed using SPSS software.
- Homework assignments are due by 11:00 PM
- To complete each assignment, access the homework assignment folder corresponding to each assignment number.
- You may work together on the homework assignment, but each of you must submit your own work on WebCampus. The assignment must be uploaded as a Word Document on WebCampus. I have provided a tutorial on WebCampus on how to convert SPSS files to Word Documents.
- Late homework assignments (i.e., submitted after the class period they are due) are docked 1 point each day they are late. See the course schedule below for all due dates. Should you need an extension, contact me one week before the assignment due date.
- All homework assignments must be completed to earn a final grade.

Please note that the data file for this class will open only on a machine that has the SPSS software.

### Scoring Rubrics for Computer Assignments

- Each homework assignment is worth ten points.
- The following grading rubric is attached to each assignment on WebCampus, and I will use it for grading. It is a good idea to look over it to understand the expectations of the assignment work.

	Not Acceptable	Acceptable	Excellent
	0	2	2.5
Timeliness	Submitted late. (1 point continues to be deducted each day the assignment is late unless prior arrangement has been made with instructor).	Submitted by due date, but in the incorrect online location.	Submitted by due date and in the correct online location.
	0	3	5
Accuracy	Answered more than half the questions inaccurately or not at all.	Answered each question in a brief but not thorough enough manner. For example, if I ask you “What is the interpretation of $r^2$ ?”, a response that is not thorough enough would be: “In the present case, variable x is correlated with variable y at $r = .50$ ; thus, $r^2 = .25$ .”	Answered each question in a brief, yet thorough manner. For example, if I ask you “What is the interpretation of $r^2$ ?”, an adequate response is: “ $r^2$ is the squared correlation coefficients between two variables. It provides a measure of the variation in one variable explained by the second variable. In the present case, variable x is correlated with variable y at $r = .50$ ; thus, $r^2 = .25$ . This indicates that variable x explains 25% of the variation in variable y.”
	0	2	2.5
Mechanics	Submitted partial printout but not in Word Document format and/or did not submit.	Submitted partial printout in Word Document format.	Submitted entire printout in Word Document format.

### Attendance & Collaborative Engagement

Attendance is required and affects the final grade (unless prior arrangement is made with the professor and/or a doctor's notice of illness is given after the absence. It is at the professor's discretion whether to excuse the absence(s) or not). For the purposes of this class, collaborative engagement is defined as presence, participation, and engagement in class discussions and activities. Your attendance pattern will influence your final grade as follows:

<u>Absences</u>	<u>Effect</u>
0 – 1	no change
2	grade drops 1/3 (e.g., B+ will drop to B)
3	grade drops 2/3 (e.g., B+ will drop to B-)
4	grade drops 1 letter (e.g., B+ will drop to C+)
<u>≥ 5</u>	F

#### EXTRA CREDIT

- I do not offer extra credit at any point in time.
- Make sure work is submitted on time and that assignments are completed successfully so you can earn an excellent grade.

#### Grading

Course grades will be based on the following cutoffs:

100-95 = A  
94-90 = A-  
89-85 = B  
84-80 = B-  
79-75 = C  
74-70 = C-  
64-69 = D  
0-64 = F

#### NCATE Standards

##### Knowledge (NCATE Standard One)

1. Compare and contrast descriptive and inferential statistics
2. Compare and contrast measures of central tendency and variation
3. Describe the properties of the normal and standard normal distributions. Explain why these properties are important
4. Interpret the correlation coefficient and  $r^2$
5. Explain the results of a linear regression analysis
6. Explain the importance of the sampling distribution of the means
7. Explain the importance of the standard error of measure
8. Describe the rationale and process of hypothesis testing
9. Describe the rationale for the t-test
10. Describe the rationale for a one-way ANOVA
11. Explain Type I and Type II errors
12. Explain "effect size"
13. Explain "power" and how to increase it
14. Interpret the results of a t-test and ANOVA

## 15. Compare and contrast different post-hoc tests of means

### Skill: Computational (NCATE Standard One)

1. Read frequency tables and distributions
2. Compute standard scores
3. Compute the correlation
4. Conduct a t-test
5. Compute a confidence interval
6. Conduct a one-way ANOVA
7. Conduct post-hoc tests of means

### Skills: Computer (NCATE Standard One)

1. Be able to log in
2. Download data from a disk
3. Create and edit data and variable files in SPSS
4. Use the “analyze” commands for a variety of statistical procedures
5. Print out data and output files
6. Read and interpret output files

### Dispositions (NCATE Standard One)

1. Explain the concept of “current statistics self-efficacy” and how it impacts your attitudes about statistics
2. Identify factors from this class that increase statistics self-efficacy
3. Distinguish between statistics self-efficacy and self-efficacy to learn statistics
4. Monitor your growth in statistics self-efficacy and summarize how your attitudes have changed throughout the semester
5. Explain how “need for cognition” is related to statistics self-efficacy

### Sample Critical Learning Incident

One crucial part of introductory statistics is understanding the concept of the “sampling distribution of the means.” This is the distribution that results when one samples from a population and computes a mean, returns these cases to the population, resamples and computes a mean, and continues this process until there are enough sample means to form a distribution. As part of Chapter 7 in EP721, we will compute a sampling distribution of the mean using random selection and track our findings. Hands on experience computing and interpreting a sampling distribution of the mean should help you understand this concept better.

### GENERAL UNLV POLICIES

**Academic Misconduct**—Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV’s function as an educational institution.

An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the *Student Academic Misconduct Policy* (approved December 9, 2005) located at: <https://www.unlv.edu/studentconduct/student-conduct>.

**Copyright**—The University requires all members of the University Community to familiarize themselves **with** and to follow copyright and fair use requirements. **You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or**

**student violations of fair use laws.** Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

**Disability Resource Center (DRC)**—The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

**Religious Holidays Policy**—Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. **It shall be the responsibility of the student to notify the instructor within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses,** of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

**Transparency in Learning and Teaching**—The University encourages application of the transparency method of constructing assignments for student success. Please see these two links for further information:

<https://www.unlv.edu/provost/teachingandlearning>

<https://www.unlv.edu/provost/transparency>

**Incomplete Grades**—The grade of I—Incomplete—can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student’s control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving “I” grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

Students may consult with a librarian on research needs. For this class, the Subject Librarian is ([https://www.library.unlv.edu/contact/librarians\\_by\\_subject](https://www.library.unlv.edu/contact/librarians_by_subject)). UNLV Libraries provides resources to support students’ access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at <https://www.library.unlv.edu/>.

**Tutoring and Coaching**—The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call 702-895-3177. The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of the SSC (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TEB second floor.

**UNLV Writing Center**—One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with

appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student's Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>.

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**Rebelmail**—By policy, faculty and staff should e-mail students' Rebelmail accounts only. Rebelmail is UNLV's official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students' e-mail prefixes are listed on class rosters. The suffix is always [@unlv.nevada.edu](mailto:@unlv.nevada.edu). **Emailing within WebCampus is acceptable.**

**Final Examinations**—The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.

EPY 721  
INTRODUCTION TO STATISTICAL METHODS

Week	Topic	Reading	Assignments
Aug 29 – Sept 4	Syllabus & Introduction	Chapter 1	
Sept 5 – 11	Organizing and Graphing Data	Chapter 2	HW 1; Due Sept 11
Sept 12 – 18	Accessing and Using SPSS		
Sept 19 – 25	Measures of Central Tendency and Variation	Chapter 3	
Sept 26 – Oct 2	The Normal Distribution	Chapter 4	HW 2; Due Oct 2
Oct 3 – 9	Correlation	Chapter 5	HW 3; Due Oct 9
Oct 10 – 16	Simple Linear Regression ***	Chapter 6	HW 4; Due Oct 16
Oct 17 – 23	<b>Quiz 1: Oct 18-23</b> (Opens Oct 18, 3PM)		[No class] Due Oct 23, 11PM
Oct 24 – 30	Probability and Sampling Distributions	Chapter 7	
Oct 31 – Nov 6	Hypothesis Testing : One Sample	Chapter 8	
Nov 7 – 13	Hypothesis Testing : Two Sample	Chapter 11	HW 5 & 6; Due Nov 13
Nov 14 – 20	ANOVA	Chapter 14	HW 7; Due Nov 20
Nov 21 – 27	Thanksgiving Day Recess		[No class]
Nov 28 – Dec 4	Multiple Comparison Tests	Chapter 15	HW 8; Due Dec 4
Dec 5 – Dec 11	<b>Quiz 2: Dec 4-10</b> (Opens Dec 4, 3PM)		Due Dec 10, 11PM

\*\*\* Please note that many students find this chapter to be the most difficult. Allow plenty of study (re-study) time.

## IMPORTANT CONCEPTS TO FOCUS ON WHILE READING

### Chapter 1

- Order of operations
- Measurement scales
- Descriptive vs. Inferential statistics

### Chapter 2

- Bar graphs, histograms, frequency distributions
- The shape of a distribution (skewness, normality)

### Chapter 3 [These concepts are extremely important]

- Central tendency: Mean
- Variation : variance, standard deviation, z score

### Chapter 4

- Normal and standard normal curves [Extremely important]
- Finding percentile and standard scores ranks

### Chapter 5

- Meaning of correlation (and how to interpret  $r$  and  $r^2$ )
- Pearson's  $r$
- Covariance (and relationship to  $r$ )
- Factors affecting the correlation

### Chapter 6

- The regression line
- The slope
- Predicting scores
- Errors in prediction

Chapter 7 [Important, but abstract. The main idea is that we use a sample value to estimate a population value. The shape of the distribution (i.e., the probability of each event in the sample) affects the accuracy of our estimate].

- Chain of reasoning in statistical inference
- Sampling distribution of the mean [Extremely important]
- Central limit theorem
- Types of samples (random vs. non-random)

### Chapter 8

- Hypothesis testing (p. 192) [Extremely important!]
- Statistical significance
- Type I and Type II errors
- Power
- The  $t$ -test

## Chapter 11

- Applied hypothesis testing with two unrelated groups
- Applied hypothesis testing with two related groups
- Statistical vs. practical significance
- Confidence intervals

## Chapter 14

- Relationship between the  $t$ -test and ANOVA
- Between and within group variance [Extremely important]
- The  $F$  ratio and  $F$  distribution
- Assumptions of ANOVA

## Chapter 15

- The rationale for post hoc tests (family wise error)
- Strategies for making pair wise comparisons
  - LSD (separate  $t$ -tests)
  - Neuman-Kuels method
  - Tukey's method
- A priori comparisons (skip the  $F$  test and proceed to Go!)