

**SYLLABUS: STATISTICAL METHODS
PSYCHOLOGY 1303, SPRING 2016 (CRN 25486)**

Meetings: Tuesdays & Thursdays, 1:30-2:50 p.m.
Miners Hall, Room 301

Instructor: Dr. James Wood, Psychology Building, Room 203
Phone: 747-6570 E-mail: jawood@utep.edu
Office Hours: Tuesdays & Thursdays 7:15-8:45 a.m. or by appointment

Text: David Freedman, Robert Pisani, and Roger Purves (2007). *Statistics* (4th edition).
New York: W. W. Norton & Company (ISBN-13: 978-0-393-92972-0. ISBN-10: 0-393-92972-8)

Calculator: For quizzes and exams, students may use only a *simple* calculator. A simple calculator is one that (a) performs addition, subtraction, multiplication, division, square roots, and squares, but (b) does not have any "memory" or "statistical" functions. Calculators with memory or statistical functions are strictly forbidden during quizzes and tests.

Lectures, Readings & Homework

(readings and homework must be completed before class on dates listed below)

Tuesday, January 19 Class 1: Introduction to course.
Thursday, January 21 Class 2: Histograms
Tuesday, January 26 Class 3: More on Histograms
Thursday, January 28 Class 4: The Mean, Median,
 and Standard Deviation (SD)

Reading due: Freedman et al. *Chapter 3. The Histogram* (pages 31-56)

Homework: Exercise Set A (pp. 33-34) 1, 2, 3, 4, 5, 6, 7
 Exercise Set B (p. 38) 1, 2, 3, 4
 Exercise Set C (pp. 41-42) 1, 2, 3, 4
 Exercise Set D (p. 44) 1, 2
 Review Exercises (pp. 50-55) 1, 2, 4, 5, 7, 9

Tuesday, February 2 Class 5: More on SD. z-scores.

Reading due: Freedman et al. *Chapter 4.*

The Average and the Standard Deviation (pages 57-77)

Homework:

Exercise Set A (pp. 60-61)	1, 2, 3, 8, 9
Exercise Set B (p. 65)	1, 2, 3, 4, 5, 6
Exercise Set C (p. 67)	1, 2, 3, 6
Exercise Set D (pp. 70-71)	1, 2, 3, 4, 5, 6, 9, 10
Exercise Set E (pp. 72-73)	1, 2, 3, 5, 6, 8, 9, 10, 11
Review Exercises (pp. 74-76)	1, 3, 5, 6, 8

Thursday, February 4 Class 6: Even More on SD

Tuesday, February 9 Class 7: Relationship of z-scores & percentiles

Reading due: Freedman et al. *Chapter 5.*

The Normal Approximation for Data (pp. 78-96)

Homework:

Exercise Set A (p. 82)	1, 2
Exercise Set B (pp. 84-85)	1, 2, 3, 4(a), 5(a), 5(b)
Exercise Set C (p. 88)	1, 2, 3
Exercise Set D (pp. 89-90)	1, 2, 3, 4
Exercise Set E (p. 92)	1, 2
(Read Section 6, but don't do Exercise Set F)	
Review Exercises (pp. 93-95)	1, 2, 4, 5, 6, 7, 8

Thursday, February 11 Class 8: FIRST MIDTERM EXAMINATION.

Tuesday, February 16 Class 9: Measurement error. Plotting points.
The formula of a line.

Readings due: (Note: There are two readings for today)

First Reading: Freedman et al., *Chapter 6.*
Measurement Error (pp. 97-105)

Second Reading: Freedman et al., *Chapter 7.*
Plotting Points and Lines (pp. 110-116)

Homework:

Homework for Chapter 6 (first reading):
Review Exercises (pp. 104-105) 1, 2, 3, 4

Homework for Chapter 7 (second reading):

Exercise Set A (p. 111)	1, 2, 3
Exercise Set B (p. 112)	1, 2, 3, 4, 5, 6
Exercise Set C (p. 114)	1
Exercise Set D (p. 115)	1, 2, 3, 4, 5, 6
Exercise Set E (p. 116)	1, 2, 3, 4, 5, 6

Thursday, February 18 Class 10: Correlation.

Tuesday, February 23 Class 11: Galton & Correlation. More on Correlation.

Readings due: (Note: There are two readings for today)

First Reading: Freedman et al., *Chapter 8.*
Correlation (pp. 119-140)

Second Reading: Freedman et al. *Chapter 9.*
More about correlation. Sections 1 & 2 only (pp. 141-146)

Homework: Homework for Chapter 8 (first reading):
Exercise Set A (p. 122) 1, 2, 3, 4, 5, 6
Exercise Set B (p. 128) 1, 2, 4, 6, 7, 9
Exercise Set C (p. 131) 1, 2, 3, 4
Exercise Set D (p. 134) 1, 2, 3, 4
Review Exercises (p. 134) 1, 3, 7, 8, 9

Homework for Chapter 9 (second reading):
Exercise Set A (p. 143) 1, 2, 3, 4, 5, 6, 10
Exercise Set B (p. 146) 3, 4

Thursday, February 25 Class 12: Prediction and Regression

Tuesday, March 1 Class 13: Predicting One Score With Another. Part I.

Thursday, March 3 Class 14: Predicting One Score With Another. Part II.

Reading due: Freedman et al. *Chapter 10. Regression.*
Sections 1, 2, 3, 5, and Summary (skip section 4)
(pp. 158-169, 174-179)

Homework: Exercise Set A (p. 161) 1, 2, 4
Exercise Set B (p. 163) 1, 2, 3
Exercise Set C (p. 167) 1, 2, 3
Exercise Set E (p. 175) 1, 2, 3
Review Exercises (pp. 176-178) 1, 2, 3, 5,
6, 9, 10

March 5-13 Spring Break

Tuesday, March 15 Class 15: RMS Error for Regression

Thursday, March 17 Class 16: Finding the Equation of the Regression Line

Readings due: (Note: There are two readings for today)

First Reading: Freedman et al., *Chapter 11. R.M.S. Error for Regression*. Sections 1-4 and Summary. (pp. 180-195,201). Skip section 5.

Second Reading: Freedman et al., *Chapter 12. The Regression Line*. Sections 1 and 2 (pp. 202-211). Skip section 3.

Homework:

Homework for Chapter 11 (first reading):

Exercise Set A (p. 184) 1, 2, 3, 4, 5, 6, 7, 8

Exercise Set B (p. 187) 1, 2(a), 2(b), 3

Exercise Set C (p. 189) 1, 2, 3

Exercise Set D (p. 193) 1, 2, 3, 4, 5(a), 5(b),
5(c), 5(d), 7

Review Exercises (p. 198) 1, 3

Homework for Chapter 12 (second reading):

Exercise Set A (p. 207) 1, 2, 3, 4

Exercise Set B (p. 210) 1, 2

Review Exercises (pp. 213-214) 1, 2, 4

Tuesday, March 22 Class 17: SECOND MIDTERM EXAMINATION

Thursday, March 24 Class 18: Introduction to Probability Theory

Tuesday, March 29 Class 19: The Law of Averages

Readings due: (Note: There are two readings for today)

First Reading: Freedman et al., *Chapter 13. What Are the Chances?* Sections 1 & 2 only (pp. 221-227)

Second Reading: Freedman et al., *Chapter 16. The Law of Averages*. Section 1 only. (pp. 273-277)

Homework:

Homework for Chapter 13 (first reading):

Exercise Set A (p. 225) 1, 2, 3, 4

Exercise Set B (p. 227) 1, 2, 3, 4

Homework for Chapter 16 (second reading):

Exercise Set A (pp. 277-278) 1, 2, 3, 6, 7, 8

Thursday, March 31 Class 20: Surveys and Polls:
Populations, Samples, and the Sampling Distribution

Tuesday, April 5 Class 21: Surveys and Polls:
 The Expected Value and the Standard Error

Reading due: *Sampling, Surveys, and Political Polls.*
 This reading and accompanying homework problems are
 posted on Blackboard.

Thursday, April 7 Class 22: Confidence Intervals (CI):
 The CI of p and the Sample Mean Around π and μ

Tuesday, April 12 Class 23: Confidence Intervals (CI):
 The CI of π and μ Around p and the Sample Mean

Reading due: *Confidence Intervals.*
 This reading and accompanying homework problems are
 posted on Blackboard.

Thursday, April 14 Class 24: Null Hypothesis Significance Testing.
 Part I

Tuesday, April 19 Class 25: Null Hypothesis Significance Testing.
 Part II

Reading due: *Null Hypothesis Significance Testing and the t-test.*
 This reading and accompanying homework problems are
 posted on Blackboard.

Thursday, April 21 Class 26: Type I Error, Type II Error, and Power
 Part I

Tuesday, April 26 Class 27: Type I Error, Type II Error, and Power.
 Part II

Reading due: *Type II Error and Statistical Power.*
 This reading and accompanying homework problems are
 posted on Blackboard.

Thursday, April 28 Summaries of student Performance Handed out;
 Preview of Final Exam;

Tuesday, May 3 Review of selected topics

Thursday, May 5 Review of selected topics

Final Exam Final exam will be Thursday, May 12, 1:00-3:00 p.m.
 in the same classroom where the course usually meets.

Course Objectives:

Students will be able to:

1. Create and interpret histograms.
2. Explain the meaning of the mean and standard deviation, estimate them from a histogram, and calculate them by hand.
3. Identify the main features of the normal curve, state the areas lying within 1 and 2 standard deviations of the mean, and convert raw scores, z-scores and percentiles into each other.
4. Interpret correlation coefficients and calculate them by hand from raw scores.
5. Interpret scatter plots and explain their relationship to the correlation coefficient
6. Interpret regression equations, calculate them by hand, and draw them (approximately) on scatter plots.
7. Explain the principle of least squares and its relationship to the regression line.
8. Explain and estimate the root mean square error of the regression line at a particular point.
9. State and explain the law of averages.
10. Explain the meaning of sampling error, and confidence intervals.
11. Explain how a sampling distribution is derived, and how it differs from a sample distribution or population distribution.
12. Explain the expected value of the mean and the standard error of the mean, and estimate their value from the standard deviation of a sample.
13. Explain the expected value of the proportion and the standard error of the proportion, and estimate their value from the standard deviation of a sample.
14. Construct a 95% and 99% Confidence interval for the population mean, based on information from a sample.
15. Construct a 95% and 99% Confidence interval for the population proportion, based on information from a sample.
16. Explain the purpose and main principles of hypothesis testing, including; the null hypothesis, the alternative hypothesis, Type I error, p values, and Type II error, and statistical power
17. Explain the sampling distribution of the difference between two means, the expected value of the difference, and the standard error of the difference, and use estimates of them to perform a t-test.

Course Requirements & Grading

1. Readings. Most readings are from the textbook *Statistics* by Freedman and his colleagues. The last four readings for the course are not in this textbook, but instead are posted as pdf files on Blackboard at least one week before they are assigned.

For the Freedman book: (a) You need the 4th edition -- earlier editions will not be adequate for the present course. (b) On Amazon.com, you can buy the 4th edition *new* for about \$110.00, or you can buy it *used* for about \$70, or you can *rent* it for about \$30. Any of these options will work fine -- but one idea is this: Rent the 4th edition for \$30 this semester. Then at the end of the semester, if you decide you want a permanent copy of the book, you can then buy an *old* edition (2nd or 3rd edition) for a lot less money.

2. Quizzes. There will be a quiz on every day that a reading assignment is due, as listed in this syllabus. Because there are 12 reading assignments, this means there will be **12 quizzes**. You may miss or drop three of these. Each of the remaining nine quizzes will count for 5% of your grade. In other words, the quizzes all together count for 45% of your total grade. There are no make-ups of any kind for quizzes.

The first quiz will be very early in the semester, at the fourth meeting of the class. Be sure to obtain a copy of the textbook right away and do the first readings and homework by that date.

Students who arrive more than five minutes after the beginning of a quiz (a) will not be allowed to take it, and (b) will be considered to have missed the quiz.

3. Midterm Exams. There will be **two midterm exams** during the regular class time. The dates of these exams are listed earlier in this syllabus. The first midterm will cover everything in the readings and lectures up until that date. The second midterm will cover everything in the readings and lectures after the first midterm and up until the date of the second midterm. The first midterm will count for 15% of your grade, and the second midterm will count for 20% of your grade.

4. Final Exam. The date and time of the **final exam** are listed earlier in this syllabus. This exam will cover everything in the course. In other words, it is *cumulative*. It will count for 20% of your grade.

Students who arrive more than ten minutes after the beginning of a midterm or the final will not be allowed to take the test and will be considered to have missed it.

You will be able to access your **final grade** for this course electronically, via the Goldmine System, Touchtone Telephone, and/or UTEP student e-mails, probably about two weeks after the final exam. If you want to know your grade before that, send an e-mail to the instructor during the last week of classes or finals week, and the instructor will e-mail your grade to you early, after your grade on the final exam is calculated.

5. Calculation of Grades for Each Quiz, Midterm, and the Final. Grades for each quiz, midterm, and final will be calculated as follows:

- (a) The top five raw grades in the class will be averaged to yield a "Top Five Average"
- (b) Each student's raw grade will then be calculated as a proportion of the Top Five Average.
- (c) For example, assume that the top five raw grades for Quiz 1 are 12, 13, 14, 12 and 14 correct, and that Josephine's grade is 11.

In this example, the Top Five Average for Quiz 1 is $(12 + 13 + 14 + 12 + 14) / 5 = 13$.
In this example, Josephine's grade for Quiz 1 is $11/13 = .846$

6. Weight of Quiz and Exam Grades:

Quizzes (best 9 out of 12)	45%
Midterm Exam 1	15%
Midterm Exam 2	20%
Final Exam	20%

7. Grade Scale for Course Grade

90% or higher	A
80% or higher, but lower than 90%	B
70% or higher, but lower than 80%	C
60% or higher, but lower than 70%	D
lower than 60%	F

8. Make-ups for Midterms and Final. There are no **make-up exams** for midterms or the final without prior arrangement. If you will miss a midterm or the final, you must make arrangements BEFORE it is given. The time and date for make-up exams will be scheduled at the instructor's convenience. A make-up for a midterm must be taken within one week before or after the scheduled date for that midterm. A make-up for the final must be taken within two weeks *before* the scheduled date for the final. Failure to take a make-up exam within these limits will result in a failing grade for that test.

9. Homework. Homework problems are assigned for each of the 12 readings in the class, as listed in the syllabus. It is highly important that you complete all these homework problems before the day that the reading is due, as explained in the next section. However, these homework problems will not be handed in or graded, and they will not be used in computing your course grade.

10. Relationship Between Quizzes and Homework. The quiz for each reading will consist mainly of the homework questions that were assigned for that reading, with slight alterations. In addition, some of the questions may be slightly changed versions of material presented in recent lectures. Midterm and final questions are also taken almost entirely from the homework questions, with slight alterations.

If you want to do well on the quizzes and exams, the key is to do the assigned readings and the associated homework problems, Attending the lectures and taking notes will also help. But the real road to success is to do the readings and all the homework questions. Most students can complete the readings and the homework by working about 3 hours per week outside of class.

11. Extra credit for Excel exercises. Five optional exercises are offered to improve your ability to use Excel for basic statistical tasks. These exercises are not required for the class. However, you can earn extra credit if you perform them correctly and submit your work by the specified deadlines. Specifically, you can increase your course grade by 1% for each correctly performed Excel exercise that you submit by the specified deadline. So as an example, let us say that Josephine's grade for the course, based on Quizzes and exams, is 87%. If Josephine correctly performs all five Excel exercises and submits them on time, she can raise her grade to 92%.

Except for the Excel exercises, there are no other opportunities for "extra credit" in this class.

More details about the Extra Credit exercises, including the deadlines for completing them, are posted on Blackboard. These exercises must be carried out sequentially (you must complete Exercise 1 before going on to Exercise 2, complete Exercise 2 before going on to Exercise 3, and so on). Thus, if you fail to complete Exercise 1 by the specified deadline, you will not be able to do the remaining exercises.

12. Contacting the Instructor. If you want to get in touch with me or set an appointment, the best way is to send me an e-mail at jawood@utep.edu (please don't use Blackboard to send me messages). You are also welcome to drop by during my office hours.

13. Blackboard for this course will contain readings for this class and listings of the homework assignments. Be sure to visit Blackboard for this class regularly.

14. Special Conditions for Quizzes and Exams. (a) Students are expected to sit in assigned seats or change seats if requested to do so by the instructor or proctor. (b) Only "simple" calculators are allowed during quizzes or exams. Use of any other electronic devices, including cell phones, smart watches, or calculators with memory or statistical functions, is forbidden. (c) No written notes of any kind are allowed during quizzes exams. (d) No talking or communication between students of any form is allowed during quizzes or exams. (e) Students may not leave the testing room during a quiz or exam for any reason, except with the permission of the instructor or proctor. (f) Failure to comply with these rules will result in a referral to the Dean of Student Life for Academic Dishonesty.

15. Information for Students With Disabilities. If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass