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Date Revised: Fall 2016
C&GE Approved: December 12, 2016
Board Approved: January 11, 2017
Semester Effective: Spring 2018

Psychology (PSYC) 2200 Elementary Statistics for the Behavioral and Social Sciences (4 Units) CSU:UC
[formerly Psychology 5]

Prerequisite: Qualification by assessment process or successful completion of Mathematics 1060 Intermediate Algebra or equivalent.

Advisory: Eligibility for English 1500 strongly recommended

Prerequisite knowledge and skills: Before entering the course, the student should be able to

1. identify numbers as belonging to specified sets, and graph discrete and continuous sets of real numbers,
2. perform the basic arithmetic operations with positive and negative real numbers, plus raising to powers,
3. know and apply the rules of exponents and the order of operations in algebraic calculations,
4. apply the properties of addition and multiplication for real numbers and identify their use in practice,
5. solve linear equations and inequalities in one variable, and analyze and solve applications leading to such equations or inequalities,
6. solve and graph the solutions of compound inequalities or absolute value inequalities in one variable,
7. perform addition, subtraction, multiplication and division of polynomials,
8. factor simple polynomials, with special emphasis on trinomials quadratic in form, and solve related polynomial equations,
9. add, subtract, multiply and divide rational algebraic expressions, and simplify to lowest terms,
10. solve equations involving rational algebraic expressions, and analyze and solve word problems leading to such equations,
11. simplify radical expressions involving numbers and/or variables,
12. use fractional exponents,
13. perform addition, subtraction, multiplication and division of expression involving radicals and complex numbers and simplify the results, including rationalization of denominators,
14. solve equations that involve radicals,
15. solve quadratic equations in one variable, and equations quadratic in form, by factoring, completing the square, and the quadratic formula,
16. analyze and solve application problems requiring the use of quadratic equations,
17. solve and graph quadratic inequalities in one variable,
18. graph points in the rectangular coordinate system, and straight lines from ordered pairs obtained from its equation,
19. determine the slope of the line between any specified pair of points,

20. know the slope forms of the equation of a straight line, and be able to determine the equation of a particular straight line from specified input information,
21. solve and graph linear inequalities in two variables,
22. solve linear systems of equations in two or three variables algebraically, and solve those in two dimensions graphically,
23. analyze and solve application problems requiring the use of linear systems of equations in two or three variables,
24. evaluate determinants and use them to solve linear systems of equations,
25. determine whether or not a specified relation is a function,
26. for a function, compute the value of the function given the value of the independent variable, and be able to construct the inverse of simple functions in numeric or algebraic terms,
27. identify the quadratic equation representing a specific conic section, and be able to draw the graph of a conic section by analyzing its equation, or to write the equation of a specified conic section,
28. solve nonlinear systems of equation involving the intersection of two conic sections or a conic section and a straight line,
29. compute and graph specified exponential and logarithmic functions,
30. know the properties of logarithms (product, quotient, power and change of base rules) and be able to use them in practical numerical computations using a table of common logarithms or a calculator, and
31. solve simple exponential and logarithmic equations.

Total Hours: 64 hours lecture

Catalog Description: This course provides students with a solid foundation in statistics as used in business, social science, psychological, sociological, and behavioral research such as administration of justice. Students will develop a useable understanding of research design, the organization of data, measures of central tendency and variability, central tendency theory, descriptive and inferential statistics, parametric and nonparametric tests, and basic test assumptions. The course includes application of technology for statistical analysis including the interpretation of the relevance of the statistical findings. Applications use data from disciplines including business, social sciences, psychology, life science, health science, and education. C-ID: SOCI 125. C-ID: MATH 110

Type of Class/Course: Degree Credit

Text: Levin, Jack A., James Alan Fox, and David R. Forde. *Elementary Statistics in Social Research*. 12th ed. USA: Pearson Higher Ed, 2014. Print

Thorne, Michael and Martin Giesen. *Statistics for the Behavioral Sciences*. 4th ed. New York: McGraw, 2002. Print

Additional Instructional Materials: Statistics capable handheld calculator, graphing paper.

Course Objectives:

By the end of the course, a successful student will be able to

1. determine level/scale of data (nominal, ordinal, interval, ratio),
2. describe populations and samples using descriptive statistics,

3. organize data using descriptive statistics,
4. develop and interpret frequency tables and histograms,
5. transform raw data into z -scores,
6. interpret z -scores in relation to research question,
7. estimate probability of occurrence for a range of scores using standardized tables,
8. calculate and interpret 95% and 99% confidence intervals in relation to research question,
9. calculate measures of dispersion,
10. compare and contrast measures of dispersion,
11. calculate measures of central tendency,
12. compare and contrast measures of central tendency,
13. discuss types of kurtosis, factors influencing kurtosis, and impact of kurtosis on validity of inferences,
14. explain central tendency theory in the context of normal population distributions,
15. explain central limits theory in the context of sample size,
16. compare and contrast descriptive and inferential statistics,
17. compare and contrast parametric and non-parametric hypothesis tests,
18. explain and apply basic assumptions underlying hypothesis testing,
19. explain use of critical scores and α level in hypothesis testing,
20. perform a statistical analysis,
21. apply the rules of probability to descriptive and inferential data,
22. identify independent and dependent variables in a research question,
23. determine the appropriate hypothesis test based on research question and level of data,
24. perform the appropriate hypothesis test based on research question and level of data,
25. use central tendency theory to explain α , β , and power of hypothesis test, sample size effects, and changes in standard deviation,
26. appropriately interpret the results of hypothesis tests,
27. appropriately relate results of hypothesis test to the research question,
28. calculate and interpret directional and non-directional t -tests on one and two sample means,
29. calculate and interpret One-way and Two-way ANOVA,
30. discuss main effects and interaction effects of Two-way ANOVA,
31. perform and interpret Pearson's Product Moment Correlation,
32. perform and interpret chi-square tests of independence,
33. perform and interpret chi-square tests of goodness of fit,
34. discuss *post hoc*, *a priori*, and non-parametric alternatives to t -tests, ANOVAs, and Pearson's Correlation,
35. write a statistical results section for an APA format research paper,
36. demonstrate familiarity with statistical analysis using a software program such as Excel, SPSS, SAS, Minitab, etc,
37. interpret data displayed in tables and graphically,
38. apply concepts of sample space and probability,
39. calculate measures of central tendency and variation for a given data set,
40. identify the standard methods of obtaining data and identify advantages and disadvantages of each,
41. calculate the mean and variance of a discrete distribution,
42. calculate probabilities using normal and t -distributions,
43. distinguish the difference between sample and population distributions and analyze the role played by the Central Limit Theorem,
44. construct and interpret confidence intervals,
45. determine and interpret levels of statistical significance including p -values,
46. interpret the output of a technology-based statistical analysis,

47. identify the basic concept of hypothesis testing including Type I and II errors,
48. formulate hypothesis tests involving samples from one and two populations,
49. select the appropriate technique for testing a hypothesis and interpret the result,
50. use regression lines and ANOVA for estimation and inference, and interpret the associated statistics, and
51. use appropriate statistical techniques to analyze and interpret applications based on data from *at least four* of the following disciplines: business, economics, social science, psychology, political science, administration of justice, life science, physical science, health science, information technology, and education.

Course Scope and Content:

- Unit I Statistics as a Language
- A. Basic statistical terms
 - B. Research terminology
- Unit II Descriptive Statistics
- A. Definitions and Scaling
 1. Random variables and expected value
 2. Measurement
 - B. Frequency Distribution and Graphing
 1. Summarizing data graphically and numerically
 2. Sampling and Sampling Distributions
 3. Discrete Distributions – Binomial
 4. Continuous Distributions – Normal
 - C. Measures of Central Tendency – Normal Distribution
 1. Central limit Theorem
 - D. Measures of Dispersion – Normal Distribution
 - E. Introduction to Probability
 1. Sample spaces and probability
 - F. Standardized Scores
- Unit III Inferential Statistics - Parametric
1. Confidence Intervals and Hypothesis Testing
 1. Estimation and confidence intervals
 2. Hypothesis Testing and Inference
 2. Significance of Difference Between Two Sample Means
 1. *t*-tests for one and two populations
 3. Probability
 4. One-way Analysis of Variance
 5. *Post hoc* Comparisons
 6. Two-way Analysis of Variance
 7. Correlation and Regression
 1. Correlations, regression lines, and prediction
 8. Summarizing data graphically and numerically
- Unit IV Inferential Statistics - Non-Parametric Testing
- A. Chi Square – Goodness of Fit and
 - B. Chi Square – Test of Independence
 1. Hypothesis Testing and Inference
 - C. Alternative tests for *t*-test and *F*-test

1. Hypothesis Testing and Inference

Unit V Applications using data from:

- A. Business
- B. Social Sciences
- C. Psychology
- D. Administration of Justice

Unit VI Technology Based Statistical Analysis

- A. Statistical Package for Social Sciences (SPSS)
- B. Excel
- C. R
- D. Statistics capable handheld calculators
- E. Other technology based statistical analysis tools

Learning Activities Required Outside of Class:

The students in this class will spend a minimum of 8 hours per week outside of the regular class time doing the following:

1. Individual study
2. Skills practice
3. Group study
4. Completing required reading
5. Performing an individually determined data collection and analysis exercise
6. Writing a research paper based on the individually determined data collection and analysis exercise

Methods of Instruction:

1. Lecture on statistical theory/research theory
2. Group discussion
3. Instructor demonstrated problem solving
4. Instructor led problem solving
5. Individual problem solving with instructor guidance
6. Group problem solving with peer guidance
7. Individual problem solving
8. Individual statistical culminating project paper

Methods of Evaluation:

1. Computational and non-computational problem-solving demonstrations including:
 - a. exams
 - b. homework problems
 - c. quizzes
 - d. discussions
 - e. peer review/observation
 - f. instructor review/observation
 - g. culminating project paper
 - h. comprehensive final exam

Supplemental Data:



TOP Code:	200100: Psychology, General
SAM Priority Code:	E: Non-Occupational
Distance Education:	Online; Offline
Funding Agency:	Y: Not Applicable(funds not used)
Program Status:	1: Program Applicable
Noncredit Category:	Y: Not Applicable, Credit Course
Special Class Status:	N: Course is not a special class
Basic Skills Status:	N: Course is not a basic skills course
Prior to College Level:	Y: Not applicable
Cooperative Work Experience:	N: Is not part of a cooperative work experience education program
Eligible for Credit by Exam:	E: Credit By Exam
Eligible for Pass/No Pass:	C: Pass/No Pass
Taft College General Education:	CSB4: CSU Area B4 IG2A: IGETC Area 2A LCAT: Local GE Communication