

Course Outline of Record

1. Course Code: SOC-003
2.
  - a. Long Course Title: Fundamentals Of Statistics
  - b. Short Course Title: FUND OF STATISTICS
3.
  - a. Catalog Course Description:
 

This course is an introductory study of statistics for the Behavioral Sciences, Emphasis is placed on acquainting students with the concepts underlying statistical methods and research approaches, basic statistical analyses, and principles. Topics include: data collection; descriptive and inferential statistics; sampling distribution; measures of central tendency; dispersion; relative standing, and relationship; probability; prediction; hypothesis evaluation; and test for treatment effects. This course is intended for students majoring in the behavioral/social sciences or those interested in applied statistics.
  - b. Class Schedule Course Description:
 

This course is a study of the fundamental concepts and techniques of statistical analysis that are encountered in all areas of Social Science.
  - c. Semester Cycle (*if applicable*): This course is offered during all sessions.
  - d. Name of Approved Program(s):
    - ANTHROPOLOGY Associate in Arts for Transfer Degree (AA-T)
    - POLITICAL SCIENCE Associate in Arts for Transfer Degree (AA-T)
    - PSYCHOLOGY Associate in Arts for Transfer Degree (AA-T)
    - SOCIOLOGY Associate in Arts for Transfer Degree (AA-T)
4. Total Units: 3.00      Total Semester Hrs: 54.00  
 Lecture Units: 3      Semester Lecture Hrs: 54.00  
 Lab Units: 0      Semester Lab Hrs: 0  
 Class Size Maximum: 35      Allow Audit: No  
 Repeatability No Repeats Allowed  
 Justification 0
5. Prerequisite or Corequisite Courses or Advisories:
 

*Course with requisite(s) and/or advisory is required to complete Content Review Matrix (CCForm1-A)*

 Prerequisite: MATH 040  
 Prerequisite: ENG 061
6. Textbooks, Required Reading or Software: (*List in APA or MLA format.*)
  - a. Frankfort-Nachmias, Chava and Leon-Guerrero, Anna (2017). *Social Statistics for a Diverse Society* (7th /e). Pine Forge Press. ISBN: 9781412992534  
 College Level: Yes  
 Flesch-Kincaid reading level: 11.5
7. Entrance Skills: *Before entering the course students must be able:*
  - a. Demonstrate critical thinking skills when reading, composing and participating in class discussions.
    - ENG 061 - Demonstrate the ability to think critically and express ideas using various patterns of development.
  - b. Demonstrate the ability to read and respond in writing beyond the literal interpretation of the text.
    - ENG 061 - Demonstrate the ability to read and respond in writing beyond the literal interpretation of the text.
  - c. Develop, organize and express complex ideas in both expository and research papers.
    - ENG 061 - Use theses to organize paragraphs into coherent analyses.
    - ENG 061 - Demonstrate the ability to think critically and express ideas using various patterns of development.
    - ENG 061 - Demonstrate the ability to use research skills including library resources such as books, periodicals, electronic databases and online resources such as the internet.

## SOC 003-Fundamentals Of Statistics

### d. Exhibit appropriate vocabulary and style.

- ENG 061 - Recognize features of style such as purpose, audience and tone integrate these elements into academic and professional writing.

### e.

Comprehend that the key characteristic of a linear model is its constant rate of change.

- MATH 040 - Comprehend that the key characteristic of a linear model is its constant rate of change.

### f.

Interpret slope as a rate of change.

- MATH 040 - Interpret slope as a rate of change.

### g.

Recognize when a table, graph, or equation is linear.

- MATH 040 - Recognize when a table, graph, or equation is linear.

### h.

Create a linear model in the form of a table, graph, or equation.

- MATH 040 - Create a linear model in the form of a table, graph, or equation.

### i.

Find the equation of a line and apply it to solve problems with a constant of change.

- MATH 040 - Find the equation of a line and apply it to solve problems with a constant of change.

### j.

Solve 2x2 and 3x3 systems of linear equations.

- MATH 040 - Solve 2x2 and 3x3 systems of linear equations.

### k.

Graph systems of linear inequalities in two dimensions.

- MATH 040 - Graph systems of linear inequalities in two dimensions.

### l.

Graph and find the equation of a circle.

- MATH 040 - Graph and find the equation of a circle.

### m.

Solve quadratic equations by factoring, completing the square, taking square roots or the quadratic formula.

- MATH 040 - Solve quadratic equations by factoring, completing the square, taking square roots or the quadratic formula.

### n.

Solve quadratic inequalities.

- MATH 040 - Solve quadratic inequalities.

### o.

Comprehend and manipulate rational exponents and Nth roots.

- MATH 040 - Comprehend and manipulate rational exponents and Nth roots.

### p.

Solve root equations.

- MATH 040 - Solve root equations.

### q.

Apply the definition of a function including function notation and terminology (domain and range).

- MATH 040 - Apply the definition of a function including function notation and terminology (domain and range).

r.

Comprehend that the key characteristic of an exponential function is its constant growth (decay) factor.

- MATH 040 - Comprehend that the key characteristic of an exponential function is its constant growth (decay) factor.

s.

Recognize when a table, graph, or equation is exponential and when a word problem can be modeled with an exponential function.

- MATH 040 - Recognize when a table, graph, or equation is exponential and when a word problem can be modeled with an exponential function.

8. Course Content and Scope:

Lecture:

**COURSE OUTLINE AND SCOPE:**

**Outline Of Topics:**

The following topics are included in the framework of the course but are not intended as limits on content. The order of presentation and relative emphasis will vary with each instructor.

I. Introduction to statistics - meaning and use in behavioral sciences

- A. Definition of statistics
- B. Reasons for studying statistics
- C. Two functions of statistics
  - 1. Descriptive statistics
    - a. Variables
    - b. Scales of measurement
  - 2. Inferential statistics
- D. Defining groups and measures
  - 1. Populations and parameters
  - 2. Samples and statistics

II. Data collection

- A. Samples
  - 1. Biased sample
  - 2. Random sample and sample size
  - 3. Sampling without and with replacement
  - 4. Selecting more than one sample
  - 5. Randomization procedures
  - 6. Independent and dependent or related samples
- B. Measurement
  - 1. Operational definitions
  - 2. Variables and mathematical concerns

III. Organizing a set of data - table format

- A. Conventions followed when constructing a table
- B. Assessing the need to organize data
- C. Types of tables
  - 1. Array
  - 2. Simple frequency distribution
  - 3. Grouped frequency distribution based on external criteria
  - 4. Relative frequency distribution
  - 5. Cumulative and percent cumulative frequency distributions

IV. Organizing a set of data - graphs and displays

- A. General format of graphs
  - 1. Figure captions
  - 2. Clearly identified zero points
  - 3. Appropriate representation of measures
  - 4. Correctly proportioned axes
  - 5. Properly labeled axes

- B. Selecting an appropriate graph
  - C. Graphs involving frequencies
    - 1. Bar graphs
    - 2. Histograms
    - 3. Frequency polygons
    - 4. Percent cumulative frequency curves
  - D. Graphs involving quantitative measures
    - 1. Bar and line graphs
    - 2. Scatter plots.
  - E. Stem-and-leaf displays
- V. Measures of central tendency
- A. Mode
    - 1. Characteristics of the mode
    - 2. Limitations of the mode
  - B. Median
    - 1. Computing the median of a frequency distribution
    - 2. Characteristics of the median
  - C. Mean
    - 1. Computing the mean for raw data or an array
    - 2. Computing the mean for frequency distributions
    - 3. The effect of transformations on the mean
    - 4. Characteristics of the mean
  - D. The meaning of unbiased estimate
  - E. Selecting a measure of central tendency
  - F. Relationships among measures of central tendency.
- VI. Measures of dispersion
- A. The range as a measure of dispersion
  - B. Other range statistics
  - C. Deviation measures of dispersion
    - 1. Average deviation
    - 2. Variance.
  - D. Using transformed scores to compute the variance
    - 1. The constant as a key factor
    - 2. Computation of the variance
  - E. Types of variance
  - F. Standard deviation
- VII. Measures of relative standing
- A. Percentile rank
    - 1. Estimating the percentile rank of a score graphically
    - 2. Estimating percentile rank mathematically.
  - B. Quantiles - percentiles, quartiles and deciles
    - 1. Estimating quantiles graphically
    - 2. Estimating quantiles mathematically
  - C. Using percentiles and percentile ranks
  - D. Standard or z-scores
    - 1. Transformation of a raw score to standard score
    - 2. Transformation of a z-score to a raw score
- VIII. Measures of relationship
- A. Correlation
  - B. The Pearson correlation coefficient,  $r$ 
    - 1. Computing  $r$
    - 2. Statistical significance of  $r$
    - 3. Comparison of  $r$  and  $r$  squared
    - 4. Caution in interpreting  $r$
  - C. Other coefficients of correlation
    - 1. Factors determining the appropriate correlation coefficient

- 2. Spearman rank-order correlation coefficient.
- D. The value of correlation in prediction
  - 1. The regression line
  - 2. Predicting Y from X
  - 3. The standard error of prediction
  - 4. The meaning of regression
- IX. Probability and decision making
  - A. Definition of probability
    - 1. Subjective definition
    - 2. Empirical definition
    - 3. Classical definition
  - B. Calculating probabilities
    - 1. Sample spaces and probability
    - 2. Theoretical distributions
    - 3. Normal distribution
    - 4. Empirical distributions
    - 5. Normal curve problems
    - 6. Normal distribution table
    - 7. Discrete distributions - binomial
  - C. Forming and evaluating research and statistical hypotheses
    - 1. Research hypothesis
    - 2. Translating a research hypothesis into a testable statistical hypothesis
    - 3. Applying a statistical test
    - 4. Using calculated probabilities to evaluate and interpret statistical hypotheses using data from disciplines including business, social sciences, psychology, life science, health science, and education
  - D. Consequences of decision making
    - 1. A true null hypothesis
    - 2. A false null hypothesis
- X. Sampling distributions, inferential statistics and hypothesis evaluation
  - A. Sample distributions
  - B. Sampling distribution of the mean and expected value
  - C. The Central Limit Theorem
  - D. Hypothesis evaluation
  - E. Evaluating a hypothesis
    - 1. Translating a research hypothesis into a testable statistical hypothesis
    - 2. Performing a statistical test
    - 3. Making decisions about the null and research hypotheses
    - 4. Reporting results
  - F. Random samples and sample size
- XI. Evaluating hypotheses and estimating parameters
  - A. The one-sample t-statistic
    - 1. Theoretical distributions and assumptions
    - 2. Computing the one-sample t-statistic
    - 3. The t-distribution.
  - B. Hypothesis testing
    - 1. Forming research and statistical hypotheses
    - 2. Measurement of the characteristic of interest
    - 3. Choosing a test statistic
    - 4. Sample size and power
    - 5. Obtaining subjects
    - 6. Evaluating statistical and research hypotheses.
  - C. Interval estimation
    - 1. Establishing confidence intervals
    - 2. Interpreting confidence intervals
- XII. Tests for treatment effects on two independent samples
  - A. Necessary conditions for using the t-statistic with two independent samples

- B. The F-statistic for determining variance of two populations
- C. The t-statistic for two random independent samples and its distribution
  - 1. Sampling distribution of the difference between two means
  - 2. Expected value of sampling distribution
  - 3. Standard error of sampling distribution
  - 4. Application of the t-statistic
  - 5. Determination of a decision rule - using table of critical values
- XIII. Tests for treatment effects on two dependent samples
  - A. Advantages of using dependent samples
  - B. Ways of achieving dependence in sampling
    - 1. Matching
    - 2. Repeated measures.
  - C. Standard error of a difference between the means of dependent samples
    - 1. Estimating variation due to unique features of sample members
    - 2. Computing covariance
    - 3. Computing the standard error of a difference between means
    - 4. Using difference scores
  - D. Parametric test of a difference between the means of two dependent samples
- XIV. Nonparametric tests of treatment effects
  - A. Chi-square test
  - B. Other nonparametrics
- XV. Comparison of means using ANOVA
  - A. Purpose
  - B. ANOVA hypothesis test
  - C. Relationship to experimental design
  - D. ANOVA models and computations
  - E. ANOVA test statistic F
  - F. One-way ANOVA
  - G. Diagramming and reporting ANOVA results

Lab: (if the "Lab Hours" is greater than zero this is required)

9. Course Student Learning Outcomes:

1.

Distinguish among the different levels of measurement and their implications and comprehend basic statistical terminology and terminology and demonstrate computing, including the use of statistical software, excel, and networking capabilities, in particular the World Wide Web, and use this information to calculate descriptive and inferential statistics commonly used in Social statistics.

2.

Identify the standard methods of obtaining data and identify advantages and disadvantages of each and distinguish the difference between sample and population distribution and analyze the role played by the Central Limit Theorem, and employ sample data to estimate population mean and proportions and measure the reliability of these estimates.

3.

Use appropriate statistical techniques including hypothesis testing for samples from one and two populations, determine and interpret levels of statistical significance including p-values, and interpret applications based on data from disciplines including business, social sciences, psychology, life science, health science, and education.

10. Course Objectives: *Upon completion of this course, students will be able to:*

- a. Describe and compute the principal measures of central tendency (mean, median and mode) and explain when it is appropriate to use each.
- b. Compute quintile measures and be able to explain when they should be used and what they mean.
- c. Compute selected measures of dispersion (e.g., variance, standard deviation, interquartile range, etc.) and skewness, and explain what they mean and how they should be used.
- d. Exhibit skill in construction selected types of graphs (e.g., histogram, polygons, Time series, statistical maps, pie graphs, frequency distributions) and explain when they should be used and what they mean.
- e. Articulate the distinction between descriptive and inferential statistics.
- f. Identify and define the basic concepts of probability theory (e.g., combinations, permutations, independent events, chance, etc.) and exhibit computational skill in applying the related mathematical principles to hypothesis testing (including skill in the use of the binomial and normal probability distributions)
- g. Identify, define and apply the basic concepts and principles of hypothesis testing. Formulate hypothesis tests involving samples from one and two populations. Select the appropriate technique for testing a hypothesis and interpret the results.
- h. Construct confidence intervals and explain what they mean and how they should be used.
- i. Distinguish parametric from nonparametric tests of significance and explain when each may be appropriately used.
- j. Articulate the scientific method and demonstrate its application to real problems through appropriate experimental design.
- k. Compute correlation measures between two variables and predict outcomes within confidence intervals using linear regression.
- l. Distinguish between valid and invalid uses of statistical data/methods in argumentation/reports.
- m. Perform tests of hypotheses regarding population proportions, means and variances.
- n. Use the chi-squared distribution to test for goodness of fit, independence and homogeneity.
- o. Compute linear correlation coefficients and fit linear regression lines.
- p. Use calculator and statistical package on computer, mainly SPSS to describe and analyze data.
- q. Examine and analyze statistical software output.
- r. Distinguish among different scales of measurement and their implications.
- s. Apply concepts of sample space and probability.
- t. Identify the standard methods of obtaining data and identify advantages and disadvantages of each.
- u. Distinguish the difference between sample and population distributions and analyze the role played by the Central Limit Theorem.
- v. Determine and interpret levels of statistical significance including p-values.
- w. Use appropriate statistical techniques to analyze and interpret applications based on data from discipline including business, social sciences, psychology, life science, health science, and education.

11. Methods of Instruction: *(Integration: Elements should validate parallel course outline elements)*

- a. Collaborative/Team
- b. Demonstration, Repetition/Practice
- c. Discussion
- d. Distance Education

- e. Lecture
- f. Technology-based instruction

12. Assignments: *(List samples of specific activities/assignments students are expected to complete both in and outside of class.)*

In Class Hours: 54.00

Outside Class Hours: 108.00

a. In-class Assignments

1. Attending classroom lectures and applying the technique of good listening by asking questions, summarizing, drawing inferences, making relevant observations, effective note-taking, etc.
2. Participate in classroom discussions to review, analyze, diagnose and evaluate various methods of solution used on their homework.
3. Participation in a class research project requiring the collection, compilation and interpretation of data, including the composition of a written report.
4. Complete examinations using problems that apply studied principles to new situations and which require both computation and the interpretation of the results.

b. Out-of-class Assignments

1. Reading textbook and published reports of statistical applications in a wide variety of fields, including the behavioral sciences, physical science, life science, literature, medicine, etc.
2. Problem solving exercises requiring both mathematical calculations and the interpretation of the results, the exercises themselves being statistical problems taken from not only the behavioral sciences but also other areas of application.
3. Complete assigned homework including problem solving, exercises to improve skills and mathematical understanding.

13. Methods of Evaluating Student Progress: *The student will demonstrate proficiency by:*

- Written homework  
The computation of statistical measures is required on all examinations and in most homework.
- Term or research papers  
Students are required to write brief critiques of published reports and arguments which employ statistical reasoning and data in support of their conclusion.
- Computational/problem solving evaluations  
Students are also required to state in writing the appropriate interpretation of statistical measures, tests and estimates as appropriate in both their homework and examinations.
- Group activity participation/observation  
Extensive computation is required of students in completing the class research project. Students are tested on their mathematical skills as they relate to the computation of descriptive measures, probability values, estimates and test statistics.
- True/false/multiple choice examinations  
Students must learn how to decide which of the many statistical measures or techniques are appropriate to specific problems encountered. Students must learn which sampling techniques are most likely to result in representative samples in particular situations.
- Mid-term and final evaluations  
Students must learn how to state clearly in plain language both the hypotheses to be tested and the results of the statistical tests on such hypotheses.
- Student participation/contribution

14. Methods of Evaluating: Additional Assessment Information:

15. Need/Purpose/Rationale -- *All courses must meet one or more CCC missions.*

CSU GE Area B: Physical and its Life Forms(mark all that apply)

B4 - Mathematics/Quantitative Thinking

# SOC 003-Fundamentals Of Statistics

## PO-GE C2 - Social and Behavioral Sciences

Identify and analyze key concepts and theories about human and/or societal development.

Critique generalizations and popular opinion about human behavior and society, distinguishing opinion and values from scientific observations and study.

## PO-BS Quantitative Reasoning

Use and comprehend quantitative language in a variety of contexts including units of measurement (e.g. milliseconds, calories), visual representations (e.g. graphs and maps), and scales.

Show quantitative intuition: a subjective "feel" for numbers including the ability to estimate, have a sense of scale, and appropriately use heuristics (rules-of-thumb).

Practice quantitative reasoning: when is quantitative reasoning appropriate and how can it be applied to simple-life problems.

## IO - Scientific Inquiry

Identify components of the scientific method.

Collect and analyze data. Skills of data collection include an understanding of the notion of hypothesis testing and specific methods of inquiry such as experimentation and systematic observation.

Predict outcomes utilizing scientific inquiry: using evidence and assertions determine which conclusions logically follow from a body of quantitative and qualitative data.

Analyze quantitative and qualitative information to make decisions, judgments, and pose questions.

Recognize the utility of the scientific method and its application to real life situations and natural phenomena.

## 16. Comparable Transfer Course

University System	Campus	Course Number	Course Title	Catalog Year
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## 17. Special Materials and/or Equipment Required of Students:

Students are Required to have access to a computer and SPSS either through the flash drive that comes with the textbook or by downloading a six month version of SPSS.

## 18. Materials Fees: Required Material?

Material or Item	Cost Per Unit	Total Cost
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## 19. Provide Reasons for the Substantial Modifications or New Course:

To align sociology 3 with C\_ID Soci-VIT 125 and Math 110. And to update the textbook

20. a. Cross-Listed Course (*Enter Course Code*): *N/A*  
 b. Replacement Course (*Enter original Course Code*): *N/A*

## 21. Grading Method (*choose one*): Letter Grade Only

## 22. MIS Course Data Elements

- a. Course Control Number [CB00]: CCC000278828
- b. T.O.P. Code [CB03]: 220800.00 - Sociology
- c. Credit Status [CB04]: D - Credit - Degree Applicable
- d. Course Transfer Status [CB05]: A = Transfer to UC, CSU
- e. Basic Skills Status [CB08]: 2N = Not basic skills course
- f. Vocational Status [CB09]: Not Occupational
- g. Course Classification [CB11]: Y - Credit Course
- h. Special Class Status [CB13]: N - Not Special
- i. Course CAN Code [CB14]: *N/A*
- j. Course Prior to College Level [CB21]: Y = Not Applicable
- k. Course Noncredit Category [CB22]: Y - Not Applicable

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l. Funding Agency Category [CB23]: Y = Not Applicable

m. Program Status [CB24]: 1 = Program Applicable

Name of Approved Program (if program-applicable): ANTHROPOLOGY,POLITICAL  
SCIENCE,PSYCHOLOGY,SOCIOLOGY

*Attach listings of Degree and/or Certificate Programs showing this course as a required or a restricted elective.)*

## 23. Enrollment - Estimate Enrollment

First Year: 45

Third Year: 45

## 24. Resources - Faculty - Discipline and Other Qualifications:

a. Sufficient Faculty Resources: Yes

b. If No, list number of FTE needed to offer this course: N/A

## 25. Additional Equipment and/or Supplies Needed and Source of Funding.

N/A

## 26. Additional Construction or Modification of Existing Classroom Space Needed. (Explain:)

N/A

## 27. FOR NEW OR SUBSTANTIALLY MODIFIED COURSES

Library and/or Learning Resources Present in the Collection are Sufficient to Meet the Need of the Students Enrolled in the Course: Yes

Textbook on Reserve at the library.

## 28. Originator Nicole Tortoris Origination Date 10/05/17