

# MATH 217: INTEGRATED STATISTICS I

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2023
Units:	5
Hours:	5 lecture per week (60 total per quarter)
Advisory:	Demonstrated proficiency in English by placement via multiple measures OR through an equivalent placement process OR completion of ESLL 125 & ESLL 249.
Degree & Credit Status:	Non-Degree-Applicable Credit Course Basic Skills, 2 Levels Below Transfer
Foothill GE:	Non-GE
Transferable:	None
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

## Student Learning Outcomes

- Students will investigate the center, shape, and spread of distributions from many relevant contexts.
- Students will develop conceptual understanding of populations, samples, and sampling distributions. They will demonstrate and communicate this understanding in a variety of ways, such as: reasoning with definitions and theorems, connecting concepts, and connecting multiple representations, as appropriate.
- Students will demonstrate the ability to calculate probabilities, descriptive statistics, and z-scores.

## Description

The first of two courses in the Statway sequence. Covers concepts and methods of statistics with an emphasis on data analysis. Topics include methods for collecting data, graphical and numerical descriptive statistics, correlation, simple linear regression, basic concepts of probability, confidence intervals and hypothesis tests for means and proportions, chi-square tests, and ANOVA. Application problems will be taken from the fields of business, economics, medicine, engineering, education, psychology, and sociology, and from culturally-diverse situations. This sequence is recommended for students with majors that require no mathematics beyond freshman-level statistics.

## Course Objectives

The student will be able to:

- Examine statistical studies and discuss an overview of the data analysis process
- Analyze data graphically and numerically
- Examine, use, and interpret bivariate data
- Use and manipulate linear functions and expressions

- Use and manipulate exponential functions and expressions
- Compute basic probabilities
- Use appropriate technology as a tool for doing statistics
- Use appropriate statistical techniques to analyze and interpret applications based on data from disciplines, including business, social sciences, psychology, life science, health science, and education

## Course Content

- Examine statistical studies and discuss an overview of the data analysis process
  - Types of statistical studies
    - Observational
    - Experimental
  - Sampling methodologies and bias
    - Simple random sampling
    - Stratified sampling
    - Systematic sampling
    - Convenience sampling
  - Experimental design
    - Random assignment
    - Lurking variables
    - Confounding variables
  - Data analysis process
    - Formulate question
    - Identify appropriate data
    - Select an appropriate data collection strategy
    - Collect, summarize, display data
    - Draw a conclusion
    - Interpret in context
  - Vocabulary
    - Variables
    - Population
    - Sample
    - Quantitative
    - Categorical
    - Study
    - Experiment
- Analyze data graphically and numerically
  - Graphical displays
    - Bar charts
    - Dot plots
    - Histograms
    - Box plots
  - Measures of center
    - Mean
    - Median
    - Mode
  - Measure of variability
    - Range
    - Variance
    - Standard deviation
  - Measures of relative standing—quartiles
  - Comparing distributions

1. Graphically
  2. Numerically
- c. Examine, use, and interpret bivariate data
- i. Scatter plots
    1. Form
    2. Interpretations
    3. Residuals
  - ii. Correlation
    1. Strength
    2. Positive
    3. Negative
  - iii. Linear regression
    1. Interpretations
    2. Extrapolation
    3. Interpolation
  - iv. Linear and exponential models
    1. Interpret parameters
    2. Make predictions
    3. Multiple representations
      - a. Tables
      - b. Graphs
      - c. Symbolic form
    4. Application problems
    5. Comparing models
    6. Residual plots
- d. Use linear functions and expressions
- i. 1-variable linear equations
    1. Solve algebraically
  - ii. 1-variable inequalities
    1. Graphs
  - iii. Linear functions
    1. Slope
    2. y-intercept
    3. Equation of a line  $y=mx+b$
    4. Interpretations
      - a. Slope
      - b. y-intercept
- e. Use exponential expressions and functions
- i. Interpret exponential expressions
  - ii. Apply properties of exponents
  - iii. Interpret exponential equations graphically
- f. Compute basic probabilities
- i. Empirical probability
  - ii. Contingency tables
    1. Conditional probability
    2. Independence
    3. Dependence
  - iii. Probability rules
- g. Use appropriate technology as a tool for doing statistics
- i. Computer lab assignments
  - ii. Excel
- h. Discuss mathematical problems and write solutions in accurate mathematical language and notation
- i. Application problems from various disciplines
  - ii. Proper notation

- i. Interpret mathematical solutions
  - i. Explain the significance of solutions to application problems

## Lab Content

Not applicable.

## Special Facilities and/or Equipment

1. A calculator will be provided.
2. Access to Microsoft Excel software or the equivalent.

## Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Written homework  
 Quizzes  
 Midterms or module exams  
 Proctored comprehensive final examination

## Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture  
 Discussion  
 Cooperative learning exercises

## Representative Text(s) and Other Materials

Navidi W., and B. Monk. Elementary Statistics, 3rd ed.. 2019.

Carnegie Foundation Statway online materials: <https://carnegiemathpathways.org/>

Carnegie Foundation Statway Lesson Workbook (ISBN 9781506645995).

## Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- a. Homework problems covering subject matter from text and related material ranging from 30-60 problems per week. Students will need to employ critical thinking in order to complete assignments
- b. Ten hours per week of lecture covering subject matter from text and related material. Reading and study of the textbook, related materials, and notes
- c. Student projects covering subject matter from textbook and related materials. Projects will require students to discuss mathematical problems, write solutions in accurate mathematical language and notation, and interpret mathematical solutions. Projects may require the use of Excel
- d. Worksheets: problems and activities covering the subject matter. Such problems and activities will require students to think critically. Such worksheets may be completed inside and/or outside of class

## Discipline(s)

Mathematics