GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

# Course Outline

**COURSE:** STAT C1000 DIVISION: 20 ALSO LISTED AS: MATH 5

TERM EFFECTIVE: Fall 2025 CURRICULUM APPROVAL DATE: 11/12/2024

SHORT TITLE: INTRODUCTION TO STATISTICS

LONG TITLE: Introduction to Statistics

| Units | Number of Weeks | Type | Contact Hours/Week | Total Contact Hours |
|---|---|---|---|---|
| 4 | 18 | Lecture: | 4 | 72 |
| | | Lab: | 0 | 0 |
| | | Other: | 0 | 0 |
| | | Total: | 4 | 72 |

| | |
|---|---|
| Out of Class Hrs: | 144.00 |
| Total Learning Hrs: | 216.00 |

**COURSE DESCRIPTION:**

This course is an introduction to statistical thinking and processes, including methods and concepts for discovery and decision-making using data. Topics include descriptive statistics; probability and sampling distributions; statistical inference; correlation and linear regression; analysis of variance,chi-squared, and t-tests; and application of technology for statistical analysis including the interpretation of the relevance of the statistical findings. Students apply methods and processes to applications using data from a broad range of disciplines.

PART II Statistical software will be extensively integrated as a tool in the description and analysis of data. Emphasis will be on interpretation of analyses for both statistical and practical significance. (C-ID: MATH 110) . Also known as MATH 5. PREREQUISITE: Placement as determined by the college's multiple measures assessment process or completion of a course taught at or above the level of intermediate algebra.

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measures assessment process or completion of a course taught at or above the level of intermediate algebra.

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

**STUDENT LEARNING OUTCOMES/OBJECTIVES:**

1. CCN #1: Assess how data were collected and recognize how data collection affects what conclusions can be drawn from the data.
2. CCN #2: Identify appropriate graphs and summary statistics for variables and relationships between them and correctly interpret information from graphs and

summary statistics.

3. CCN #3: Describe and apply probability concepts and distributions.
4. CCN #4: Demonstrate an understanding of, and ability to use, basic ideas of statistical processes, including hypothesis tests and confidence interval estimation.
5. CCN #5: Identify appropriate statistical techniques and use technology-based statistical analysis to describe, interpret, and communicate results.
6. CCN #6: Evaluate ethical issues in statistical practice.

**STUDENT LEARNING OUTCOMES/OBJECTIVES - PART II:**

1. Local Objective #1 Distinguish different scales of measurement (nominal, ordinal, interval, ratio) with respect to defining characteristics and implications for selection of correct statistical procedures.

2. Local Objective #2 Define, compare, contrast, and interpret discrete and continuous random variables.

3. Local Objective #3 Discuss sampling methods and identify the standard methods of obtaining data and identify advantages and disadvantages of each.

4. Local Objective #4 Describe and analyze data using descriptive statistics including histograms, frequency tables, stem-and-leaf diagrams, box plots, mean, median, mode, and standard deviation.

5. Local Objective #5 Calculate and interpret measures of central tendency and variability for discrete and continuous distributions. These measurements should include but are not limited to mean, median, mode, midrange, range, standard deviation, variance, and inter-quartile range.

6. Local Objective #6 Calculate and interpret probabilities for simple events, grounded in the context of application data.

7. Local Objective #7 Interpret and apply the Central Limit Theorem, grounded in real-world application data.

8. Local Objective #8 Calculate and interpret continuous probabilities, including normal probabilities, using probability tables and technology such as statistical

software or graphing calculator capabilities.

9. Local Objective #9 Compute and interpret confidence interval estimates of population means, population proportions, and population standard deviation.

10. Local Objective #10 Accurately demonstrate each step of hypothesis testing protocols including identification of Type I and Type II errors, written statements of

null and alternative hypotheses using correct notation, definition of rejection regions and critical values, computation and interpretation of test statistics, and

written interpretations of final conclusions. Employ hypothesis test procedures to test claims about one-sample means, proportions and variance or standard

deviation, two-sample means and proportions for independent samples, and dependent means.

11. Local Objective #11 Compute and interpret linear correlation coefficients and simple linear regression coefficients with respect to statistical significance,

reliability, validly, and practical significance, grounded in real-world application data from diverse fields such as biology, social sciences, epidemiology,

agriculture, business, and education.

12. Local Objective #12 Solve application problems using data from disciplines including business, social sciences, psychology, life sciences, health sciences,

natural sciences, and education.

13. Local Objective #13 Use a chi-square test to analyze frequency counts of categorical data partitioned into different categories.

14. Local Objective #14 Apply the methods of one-way analysis of variance to conduct a hypothesis test of three or more population means.

15. Local Objective #15 Utilize statistical software to analyze and interpret data.

16. Local Objective #16 Synthesize concepts learned throughout the semester by a group project, which will require students to formulate a survey and collect data

or locate a large public domain dataset, analyze data, and derive inferences from the data.

**COURSE CONTENT:**

1. Introduction to statistical thinking and processes
2. Technology-based statistical analysis
3. Applications using data from four or more of the following disciplines: administration of justice, business, economics, education, health science, information technology, life science, physical science, political science, psychology, and social science
4. Units (subjects/cases) and variables in a data set, including multivariable data sets
5. Categorical and quantitative variables
6. Sampling methods, concerns, and limitations, including bias and random variability
7. Observational studies and experiments
8. Data summaries, visualizations, and descriptive statistics
9. Probability concepts
10. Probability distributions (e.g., binomial, normal)
11. Sampling distributions and the Central Limit Theorem
12. Estimation and confidence intervals
13. Hypothesis testing, including t-tests for one and two populations, Chi-squared test(s), and ANOVA; and interpretations of results
14. Regression, including correlation and linear regression equations

**COURSE CONTENT: Part II: Elaboration and Extension of Part I**

Curriculum Approval Date: 11/12/2024

1. Introduction to basic terms, vocabulary and notation, including sample, population, statistic, parameter, levels of measurement, qualitative vs quantitative.

2. Introduction to sampling methods and ethical research design.

3. Tabular and graphical techniques for description:

Frequency distributions, histograms, stem-and-leaf plots, dot plots, box plots. Ethical considerations in construction of visual displays.

4. Central tendency, variability, and relative standing:

Computation and interpretation of measures of central tendency (mean, median, mode, midrange), variability (range, standard deviation, variance), and relative standing (coefficient of variation and z-scores).

5. Introduction to statistical software:

Using Statdisk, Statcrunch, or similar statistical software, demonstration and practice inputting, sorting, saving data. Demonstration and practice in using software to compute basic measurements of central tendency and variability. Critical evaluation and written interpretations of results. Software is seamlessly integrated throughout the entire course as a computational tool.

6. Discrete probability and discrete probability distributions:

Multiplication and addition rules.

Complements, conditional probability, Bayes Theorem.

Counting methods (combinations, permutations, factorials).

Computation of binomial distributions and binomial probabilities.

7. Continuous normal probability distributions:

Topics covered will include standard and nonstandard normal distributional theory.

Techniques for computing normal probabilities given a z-score.

Given a z-score, computing areas and understanding the correspondence between area and probability.

8. Central Limit Theorem:

Application to the sampling distribution of the sample means and resulting probabilities.

Application of the Central Limit theorem to problems involving probability of group means.

Demonstration of computer simulations of the sampling distribution of means of large samples to reinforce and illustrate the Central Limit Theorem.

9. Estimates and Sample Sizes:

Create and interpret confidence intervals to estimate population proportions, means, and standard deviations.

Compute required sample sizes as part of preparation for research projects.

10. Hypothesis Testing:

Basic concepts, procedures, and interpretations used for hypothesis testing of one-sample claims made about population means, proportions, and standard deviations or variances.

Basic concepts, procedures, and interpretations used for hypothesis testing of two-sample claims made about two population proportions and means.

Basic concepts, procedures, and interpretations of hypothesis tests about the mean of differences of matched pairs (dependent samples).

**COURSE CONTENT: Part II: Elaboration and Extension of Part I (CONTINUED)**

11. Linear Correlation and Regression:

Analysis of relationships between two variables using linear correlation and least squares simple linear regression procedures for description and prediction.

12. ANOVA:

One way analysis of variance (ANOVA) for the simultaneous testing of the equality of three or more means.

13. Chi-square analysis:

Tests for independence of contingency tables.

14. Group Project:

Students will decide on project topic, select a substantive data set or collect survey data, compute and interpret descriptive statistics, hypothesis tests, and correlation/regression.

15. Final Exam (A two-hour final exam is required.)

**METHODS OF INSTRUCTION:**

Lecture, discussion, collaborative problem-solving, and instructor-guided project work incorporating statistical software or graphing calculators.

**OUT OF CLASS ASSIGNMENTS:**

Required Outside Hours 144

Assignment Description

Required Outside Hours:144

Assignment Description:

Textbook reading assignments (32 hours)

Homework problem sets (32 hours)

Online Discussions (14 hours)

Group Problem-Solving Activities (including Reading Logs) (14 hours)

Analyze and interpret datasets using statistical software (22 hours)

Class Project: Using data collected by the student, or a dataset of the student's choosing, analyze survey results and derive inferences from the data. (30 hours)

**METHODS OF EVALUATION:**

Other methods of evaluation

Evaluation Percent

100

Evaluation Description

Part 1:

Examples of potential methods of evaluation used to observe or measure students?

achievement of course outcomes and objectives could include but are not limited to quizzes,

exams, laboratory work, field journals, projects, research demonstrations, etc. Methods of

evaluation are at the discretion of local faculty.

**REPRESENTATIVE TEXTBOOKS:**

Introductory Statistics 2e, Illowsky, B., Dean, S, OpenStax, 2023 or a comparable textbook/material.

Rationale: One of the four textbooks suggested by the state CCN template.

College Level Grade Verified by: CCN Template Review

Triola. Essentials of Statistics, 7th Edition Pearson, 2022. Or other appropriate college level text., Mario F. Triola, Pearson, 2022 or a comparable textbook/material.

ISBN: 9780137466092

12+ Grade Verified by: Jennifer Nari

**OTHER MATERIALS:**

Introduction to Modern Statistics 2e, Çetinkaya-Runde, M., Hardin, J., OpenIntro, 2024 ($0 25): https://www.openintro.org/book/ims/

Statistics: Learning From Data 3e, Peck, R., Case, C., Cengage, 2024 ($57-250): https://www.cengage.com/c/new-edition/9780357758298/

Introductory Statistics: Exploring the World Through Data 4e, Gould, R., Wong, R., Ryan, C., Pearson, 2025 ($65-80): https://www.pearson.com/en-us/subject-catalog/p/introductory statistics/P200000011641/9780138242145

Introductory Statistics: Analyzing Data with Purpose, The Dana Center Mathematics Pathways, Charles A. Dana Center, University of Texas at Austin, 2021 ($0): https://www.utdanacenter.org/products/introductory-statistics

**ARTICULATION and CERTIFICATE INFORMATION**

Associate Degree:

GAV B4

GAV Area 2 = Math Con & Q Reas

CSU GE:

CSU B4

IGETC:

IGETC 2A

CSU TRANSFER:

Transferable to CSU

UC TRANSFER:

Transferable to UC

**SUPPLEMENTAL DATA:**

Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education: N
Program Status: 1 Program Applicable
Special Class Status: N
C-ID: (MATH 110)
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N
Occupational Course: E
Course Control Number: CCC000647637
Sports/Physical Education Course: N
Taxonomy of Program: 170100