GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: MATH 5 DIVISION: 20 ALSO LISTED AS:

TERM EFFECTIVE: Summer 2024 CURRICULUM APPROVAL DATE: 02/13/2024

SHORT TITLE: INTRO 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:

Descriptive analysis and presentation of either single-variable data or bivariate data, probability, probability distributions, normal probability distributions, sample variability, statistical inferences and hypothesis testing involving one population and two populations with both dependent and independent sampling, analysis of variance, linear correlation and regression analysis, and chi-square analysis. 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) PREREQUISITE: Intermediate algebra or equivalent skills or placement by multiple measures.

PREREQUISITES:

Completion of MATH 233, as UG, with a grade of C or better.
OR
Completion of MATH 233B, as UG, with a grade of C or better.
OR
Completion of MATH 235, as UG, with a grade of C or better.
OR
Completion of MATH 240, as UG, with a grade of C or better.
OR
Completion of MATH 242, as UG, with a grade of C or better.
OR
Completion of MATH 3, as UG, with a grade of C or better.
OR
Completion of MATH 6, as UG, with a grade of C or better.
OR
Completion of MATH 7, as UG, with a grade of C or better.
OR
Completion of MATH 8A, as UG, with a grade of C or better.
OR
Completion of MATH 8B, as UG, with a grade of C or better.
OR
Completion of MATH 12, as UG, with a grade of C or better.
OR
Completion of MATH 14, as UG, with a grade of C or better.
OR
Completion of MATH 1A, as UG, with a grade of C or better.
OR
Completion of MATH 1B, as UG, with a grade of C or better.
OR
Completion of MATH 1C, as UG, with a grade of C or better.
OR
Score of 33 on Intermediate Algebra
OR
Score of 13 on Pre-Calculus
OR
Score of 2600 on Accuplacer Math
OR
Score of 2600 on MM CCCApply Math
OR
Score of 2600 on MM Placement Tool Math

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion

05 - Hybrid

71 - Dist. Ed Internet Simultaneous

72 - Dist. Ed Internet Delayed

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Compute and interpret data using descriptive statistics including histograms, frequency tables, boxplots, mean, median, mode, and standard deviation.

2. Compute and interpret confidence interval estimates of population means or population proportions.

3. Conduct hypothesis testing procedures to test claims about single population means and proportions, and two population means and proportions. Select the appropriate technique (p-value, t-test, z-test) and provide written interpretation of the results.

4. Using statistical software, compute linear correlation coefficient and regression coefficients for simple linear regression, use resultant equation for prediction, and provide written interpretation of results.

COURSE OBJECTIVES:

By the end of this course, a student should:

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

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

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

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

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

8. Calculate and interpret continuous probabilities, including normal probabilities, using probability tables and technology such as statistical software or graphing calculator capabilities.

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

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. 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. Solve application problems using data from disciplines including business, social sciences, psychology, life sciences, health sciences, natural sciences, and education.

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

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

15. Utilize statistical software to analyze and interpret data.

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.

CONTENT:

Curriculum Approval Date: 02/13/2024

3 HOURS

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

2 HOURS

Introduction to sampling methods and ethical research design.

3 HOURS

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 HOURS

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).

2 HOURS

Introduction to statistical software. Using Statdisk, Statcrunch, or similar statistical software, demonstration and practice in 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.

After this introduction, software is seamlessly integrated throughout the entire course as a computational tool.

4 HOURS

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.

6 HOURS

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.

3 HOURS

Central Limit Theorem and its application to the sampling distribution of the sample means and resulting probabilities.

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

1 HOUR

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

5 HOURS

Estimates and Sample Sizes

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

Compute required sample sizes as part of planning stage for research projects.

8 HOURS

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

8 HOURS

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

3 HOURS

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

5 HOURS

Linear Correlation and Regression.

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

3 HOURS

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

2 HOURS

Chi-square analysis. Tests for independence of contingency tables.

8 HOURS

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.

2 HOURS

Final Exam

METHODS OF INSTRUCTION:

Instruction will be by lecture/discussion with periodic cooperative problem solving sessions with student presentations.

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours 144

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:

Writing assignments

Evaluation Percent 15

Evaluation Description

Online discussions, written interpretation of software output, reading logs, written project.

Problem-solving assignments

Evaluation Percent 35

Evaluation Description

Homework Problems, Software-based problems and reports, Quizzes, Final Project

Objective examinations

Evaluation Percent 50

Evaluation Description

Written examinations.

REPRESENTATIVE TEXTBOOKS:

Triola. Essentials of Statistics, 7th Edition Pearson, 2022. Or other appropriate college level text., Mario F. Triola, ISBN-10: 9780137466092, 2022 or a comparable textbook/material.

ISBN:

12+ Grade Verified by: Jennifer Nari

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

GAV B4, effective 000000

CSU GE:

CSU B4, effective 000000

IGETC:

IGETC 2A, effective 000000

CSU TRANSFER:

Transferable CSU, effective 000000

UC TRANSFER:

Transferable UC, effective 000000

SUPPLEMENTAL DATA:

Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN: STAT2
CAN Sequence: XXXXXXXX
CSU Crosswalk Course Department: MATH
CSU Crosswalk Course Number: 110
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N
Occupational Course: E
Maximum Hours:
Minimum Hours:
Course Control Number: CCC000642738
Sports/Physical Education Course: N
Taxonomy of Program: 170100