

San Francisco State University
Department of Mathematics
Course Syllabus

MATH 124
Elementary Statistics

Prerequisites

Satisfactory completion of the ELM requirement.

Bulletin Description

Data analysis, probability, and statistical inference. For students in any field where statistics is a means of communication and a tool for decision making. Meets Quantitative Reasoning requirement.

Course Objectives

The main purpose of the course is to introduce the student to the nature and scope of statistical methods. The increasing use of statistical techniques in almost all fields of human endeavor has led to a proliferation of techniques of varying complexity. Math 124 is not meant to be a cram course in such methods. The main problems of statistical inference are introduced and several important techniques are discussed with the emphasis at all times on the underlying concepts. The student must be led to appreciate the fact that the validity of any statistical analysis rests heavily on the realism of the underlying probability models and on the proper experimental design.

The students will learn how to perform basic sampling and review experimental designs. They will be able to calculate descriptive statistics and present data in various forms such as tables and graphs. They will be able to analyze data using inferential techniques. They will learn to use probability to discuss everyday events such as playing Lotto and other games and use probability to bridge the gap between descriptive statistics and inferential statistics.

Evaluation of Students

Instructors' assessment is usually based on homework, quizzes, computer assignments, exams, and a final.

Course Outline

- Introduction: Some examples where statistics is applicable; Need for mathematical models
- Descriptive Statistics: Frequency tables, Histograms, Bar graphs, Pie charts, Stem-and-Leaf plots, Time plots, Boxplots, and their interpretation; Measures of central tendency (Mean, Median, Mode); Measures of dispersion (Range, Percentiles, Interquartile range, Variance, Standard Deviation) (2 weeks)
- Correlation and Linear Regression; Scatter plot, Correlation Coefficient; Least-Square Linear Regression, Coefficient of determination (2 weeks)
- Probability Theory: Random Variables, General Probability Rules, Conditional Probability, Independent Events, Bayes's Theorem (2 weeks)
- Probability and Sampling Distributions: Binomial distribution, Normal distribution, Approximation of Binomial Distribution with normal distribution, Law of Large Numbers, Central Limit Theorem (2 weeks)
- Sampling & Designing of Experiments: Simple Random Samples, Use of random number tables, Probability Samples, Stratified Random Samples, Multistage Samples; Comparative Experiments, Randomized Comparative Experiments; Completely Randomized Designs, Block Designs (1week)
- Estimation: Point Estimation, Margin of Error, Confidence Interval Estimation for means and proportions, for One-Sample and Two-Sample problems (3 weeks)
- Test of Significance: Null and Alternative Hypotheses, Type I and Type II Errors, Significance Level, p-value, Hypothesis testing for means and proportions, for One-Sample and Two-Sample problems (2 weeks)
- Chi-Square Tests: Contingency Tables; Test of independence; Goodness of fit test; Test of Homogeneity (1 week)

Textbooks and Software

Recent texts include:

Statistics Informed Decisions Using Data, Michael Sullivan, III

The Basics Practice of Statistics, David S. Moore, Freeman

Microsoft Excel

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