

FULLERTON JOINT UNION HIGH SCHOOL DISTRICT

MATHEMATICS - Probability and Statistics

I. Course Information

- 1. Course Title:** Probability and Statistics
- 2. Length of Course:** Year
- 3. Units of Credit:** Ten
- 4. Prerequisites:** Refer To Registration Presentation
- 5. Grade Level:** 11 (if completed Algebra 2 with C- or better)
12 (if completed Algebra 1/equivalent with C- or better;
Geometry recommended)
- 6. Special Course Designation:** None
- 7. Course Code Number:**
- 8. Course Materials:** Title: Statistics and Probability with Applications, 3rd ed. (2017)

Authors: Starnes and Tabor
Publisher: Bedford, Freeman and Worth
online site for students & teachers: Launchpad

II. Course Description

This course is an introduction to the study of probability, interpretation of data, and fundamental statistical problem solving. Students will collect and organize data and apply an understanding of chance and inference. Mastery of this academic content will provide students with a solid foundation in probability and facility in processing statistical information.

III. Course Goals

Students will complete this course with knowledge and proficiency in the following topics:

1. Producing data
2. Organizing data
3. Chance
4. Inference
5. Recognizing sampling methods
6. Designing experiments
7. Performing and interpreting statistical analysis
8. Calculating elementary probability
9. Performing hypothesis testing
10. Finding confidence intervals

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IV. Content and Course Objectives

Objectives

- 1.0 Students know the Definition of the notion of independent events and can use the rules for addition, multiplication, and complementation to solve for probabilities of particular events and finite sample spaces.
- 2.0 Students know the definition of conditional probability and use it to solve for probabilities in finite sample spaces.

3.0 students demonstrate an understanding of the notion of discrete random variables are using them to solve for the probabilities of outcomes, such is the probability of the occurrence of five head skin 14 coin tosses.

4.0 Students are familiar with the standard distribution (normal, binomial, and exponential) and can use them to solve for events in problems in which the distribution belongs to those families.

5.0 Students determine the mean and standard deviation of a normally distributed random variable.

6.0 Students know the definition of the mean, median, and mode of a distribution of data and can compute each in particular situations.

7.0 Students compute the variance and the standard deviation of the distribution of data.

8.0 Students organize and describe distributions of data by using a number of different methods, including

frequency tables, histograms, standard line and bar graphs, stem-and-leaf displays, scatterplot, and box-and-whisker plots.

Content

Chapter 1 - Analyzing One-Variable Data

Lesson 1.1 - Statistics: The Science and Art of Data

Lesson 1.2 - Displaying Categorical Data

Lesson 1.3 - Displaying Quantitative Data: Dotplots

Lesson 1.4 - Displaying Quantitative Data: Stemplots

Lesson 1.5 - Displaying Quantitative Data: Histograms

Lesson 1.6 - Measuring Center

Lesson 1.7 - Measuring Variability

Lesson 1.8 - Summarizing Quantitative Data: Boxplots and Outliers

Lesson 1.9 - Describing Location in a Distribution

Chapter 2 - Analyzing Two-Variable Data

Lesson 2.1 - Relationships between Two Categorical Variables

Lesson 2.2 - Relationships between Two Quantitative Variables

Lesson 2.3 - Correlation

Lesson 2.4 - Calculating the Correlation

Lesson 2.5 - Regression Lines

Lesson 2.6 - The Least-Squares Regression Line

Lesson 2.7 - Assessing a Regression Model

Lesson 2.8 - Fitting Models to Curved Relationships

Chapter 3 - Collecting Data

Lesson 3.1 - Introduction to Data Collection

Lesson 3.2 - Sampling: Good and Bad

Lesson 3.3 - Simple Random Samples

Lesson 3.4 - Estimating a Margin of Error

Lesson 3.5 - Sampling and Surveys

Lesson 3.6 - Observational Studies and Experiments

Lesson 3.7 - How to Experiment Well

Lesson 3.8 - Inference for Experiments

Lesson 3.9 - Using Studies Wisely

Chapter 4 - Probability

Lesson 4.1 - Randomness, Probability, and Simulation

Lesson 4.2 - Basic Probability Rules

Lesson 4.3 - Two-Way Tables and Venn Diagrams

Lesson 4.4 - Conditional Probability and Independence

Lesson 4.5 - The General Multiplication Rule and Tree Diagrams
Lesson 4.6 - The Multiplication Rule for Independent Events
Lesson 4.7 - The Multiplication Counting Principle and Permutations
Lesson 4.8 - Combinations and Probability

Chapter 5 - Random Variables

Lesson 5.1 - Introduction to Random Variables
Lesson 5.2 - Analyzing Discrete Random Variables
Lesson 5.3 - Binomial Random Variables
Lesson 5.4 - Analyzing Binomial Random Variables
Lesson 5.5 - Continuous Random Variables
Lesson 5.6 - The Standard Normal Distribution
Lesson 5.7 - Normal Distribution Calculations

Chapter 6 - Sampling Distributions

Lesson 6.1 - What Is a Sampling Distribution?
Lesson 6.2 - Sampling Distributions: Center and Variability

Lesson 6.3 - The Sampling Distribution of a Sample Count (The Normal Approximation to the Binomial)

Lesson 6.4 - The Sampling Distribution of a Sample Proportion

Lesson 6.5 - The Sampling Distribution of a Sample Mean

Lesson 6.6 - The Central Limit Theorem

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Chapter 7 - Estimating a Parameter

Lesson 7.1 - The Idea of a Confidence Interval

Lesson 7.2 - What Affects the Margin of Error?

Lesson 7.3 - Estimating a Proportion

Lesson 7.4 - Confidence Intervals for a Proportion

Lesson 7.5 - Estimating a Mean

Lesson 7.6 - Confidence Intervals for a Mean

Chapter 8 - Testing a Claim

Lesson 8.1 - The Idea of a Significance Test

Lesson 8.2 - Significance Tests and Decision Making

Lesson 8.3 - Testing a Claim about a Proportion

Lesson 8.4 - Significance Tests for a Proportion

Lesson 8.5 - Testing a Claim about a Mean

Lesson 8.6 - Significance Tests for a Mean

Chapter 9 - Comparing Two Populations or Treatments

Lesson 9.1 - Estimating a Difference between Two Proportions

Lesson 9.2 - Testing a Claim about a Difference between Two Proportions

Lesson 9.3 - Estimating a Difference between Two Means

Lesson 9.4 - Testing a Claim about a Difference between Two Means

Lesson 9.5 - Analyzing Paired Data: Estimating a Mean Difference

Lesson 9.6 - Testing a Claim about a Mean Difference

Chapter 10 - Inference for Distributions and Relationships

Lesson 10.1 - Testing the Distribution of a Categorical Variable

Lesson 10.2 - Chi-Square Test for Goodness of Fit

Lesson 10.3 - Testing the Relationship between Two Categorical Variables

Lesson 10.4 - Chi-Square Tests for Association

Lesson 10.5 - Testing the Relationship between Two Quantitative Variables

Lesson 10.6 - Inference for the Slope of a Least-Squares Regression Line