Phoenix Christian High School
MTH420 Statistics
Course Scope & Sequence (2010)

COURSE DESCRIPTION

Goal of the Mathematics Program: Provide students with a well-rounded base of mathematical knowledge that they will be able to apply in a variety of contexts. Underscore the hand of God in the creation through mathematics.

Statistics Objective: Students will use statistics to perform calculations, make decisions, provide explanations and apply results to real-life settings.

REQUIRED TEXTS AND *KEY SUPPLEMENTAL MATERIALS

Elementary Statistics: Picturing the World, Larson and Farber, Prentice Hall
TI-83 Plus or TI-84 Graphing Calculator (required)

COURSE SCOPE AND SEQUENCE

First Semester

Introduction to Statistics 4 Weeks

Key Concepts: An Overview of Statistics, Distinguishing Between a Population and a Sample, Distinguishing Between a Parameter and a Statistic, Distinguishing Between Descriptive Statistics and Inferential Statistics, Distinguishing Between Qualitative Data and Quantitative Data, Classifying Data With Respect to the Four Levels of Measurement, Designing a Statistical Study, Collecting Data, Creating a Random Sample.

Assessments: Homework, Unit Test, Quizzes, Project: Survey Data

Descriptive Statistics 4 Weeks

Key Concepts: Constructing a Frequency Distribution, Constructing Frequency Histograms, Constructing Frequency Polygons, Constructing Relative Frequency Histograms and Ogives, Graphing and Interpreting Quantitative Data Sets Using Stem-and-Leaf Plots and Dot Plots, Graphing and Interpreting Qualitative Data Sets Using Pie Charts and Pareto Charts, Graphing and Interpreting Paired Data Sets Using Scatter Plots and Time Series Charts, Finding the Mean, Median, and Mode of a Population and a Sample, Finding the Weighted Mean and the Mean of a Frequency Distribution, Describing the Shape of a Distribution, Finding the Range of a Data Set, Finding the Variance and Standard Deviation of a Population and of a Sample, Using the Empirical Rule and Chebychev's theorem to Interpret Standard Deviation, Approximating the Sample Standard Deviation For Grouped Data, Finding the First, Second, and Third Quartiles of a Data Set, Finding the Interquartile Range of a Data Set, Representing a Data Set Graphically Using a Box-and-Whisker Plot, Interpreting Other Fractiles Such as Percentiles, Finding and Interpreting the Standard Score, Using Technology to Determine Descriptive Statistics.

Assessments: Homework, Unit Test, Quizzes, Project: Graphing Survey Data Appropriately

Probability 4 Weeks

Key Concepts: Identifying the Sample Space of a Probability Experiment, Identifying Simple Events, Distinguishing Among Classical, Empirical, and Subjective Probabilities, Identifying and Using Properties of Probability, Finding the Probability of an Event, Distinguishing Between Independent and Dependent Events, Using the Multiplication Rule to Find the Probability of Two Events Occurring In Sequence, Using the Multiplication Rule to Find Conditional Probabilities, Determining If Two Events are Mutually Exclusive, Using the Addition Rule to Find the Probability of Two Events, Using the Fundamental Counting Principle, Finding the Number of Ways a Group of Objects Can Be Arranged In order, Finding the Number of Ways to Choose Several Objects From a Group, Using Counting Principles to Find Probabilities.
Assessments: Homework, Unit Test, Quizzes, Project: Investigating Probability

Discrete Probability Distributions 4 Weeks

Key Concepts: Distinguishing Between Discrete Random Variables and Continuous Random Variables, Constructing Discrete Probability Distributions and their Graphs, Determining if a Distribution Is a Probability Distribution, Finding the Mean, Variance, and Standard Deviation of a Discrete Probability Distribution, Finding the Expected Value of a Discrete Probability Distribution, Determining if a Probability Experiment Is a Binomial Experiment, Finding Binomial Probabilities Using the Binomial Probability Formula, Using a Binomial Probability Table, Using Technology to Find Binomial Probabilities, Constructing Binomial Distributions and their Graphs, Finding Mean, Variance, and Standard Deviation of a Binomial Probability Distribution, Finding Probabilities Using the Geometric Distribution, Finding Probabilities Using the Poisson Distribution.
Assessments: Homework, Unit Test, Quizzes, Project: Creating a Binomial Distribution for Research Data.
Biblical Integration: Writing Across the Curriculum assignment that analyzes world view behind a researched statistical study.

Second Semester

Normal Probability Distributions 3 Weeks

Key Concepts: Interpreting Graphs of Normal Probability Distributions, Estimating areas Under a Normal Curve, Estimating Probabilities For Random Variables With Normal Distributions, Finding Areas Under the Normal Standard Curve, Finding Probabilities for Normally Distributed Variables, Finding a Z-Score Given the Area Under a Normal Curve, Transforming a Z-Score to an X-Value, Finding a Specific Data Value of a Normal Distribution, Finding Sampling Distributions and Verifying their Properties, Interpreting the Central Limit theorem, Applying the Central Limit theorem to Find the Probability of a Sample Mean, Deciding When the Normal Distribution Can Approximate the Binomial Distribution, Finding the Correction For Continuity, Using the Normal Distribution to Approximate Binomial Probabilities.
Assessments: Homework, Unit Test, Quizzes, Project: Random Number Activity

Confidence Intervals 3 Weeks

Key Concepts: Finding a Point Estimate and a Maximum Error of Estimate, Constructing and Interpreting Confidence Intervals For the Population Mean, Determining the Required Minimum Sample Size When Estimating the Mean, Interpreting the T-Distribution and Using a T-Distribution Table, Constructing Confidence Intervals For Small Samples, Finding a Point Estimate For the Population Proportion, Constructing a Confidence Interval For a Population Proportion, Determining the Required Minimum Sample Size When Estimating a Population Proportion.

Assessments: Homework, Unit Test, Quizzes.

Hypothesis Testing With One Sample 3 Weeks

Key Concepts: Stating a Null Hypothesis and an Alternate Hypothesis, Identifying Type I and Type II Errors and interpreting the Level of Significance, Deciding Whether to Use One-Tailed or Two-Tailed Statistical Test, Finding and Using P-Values to Test a Mean, Making and interpreting a Decision Based On the Results of a Statistical Test, Writing a Claim For a Hypothesis Test, Finding Critical Values and Rejection Regions in a Normal Distribution, Using Rejection Regions For a Z-Test, Finding Critical Values in a T-Distribution, Using the T-Test to Test a Mean, Using Technology to Find P-Values and Using them With a T-Test to Test a Mean, Using a Z-Test to Test a Population Proportion.

Assessments: Homework, Unit Test, Quizzes.

Hypothesis Testing With Two Samples 3 Weeks

Key Concepts: Performing a Two-Sample Hypothesis Z-Test For the Difference Between Two Means, Performing a T-Test For the Difference Between to Population Means, Deciding Whether Two Samples are independent or Dependent, Performing a T-Test to Test the Mean of the Differences For a Population of Paired Data, Performing a Z-Test For the Difference Between Two Population Proportions, Using Technology to Perform Two-Sample Hypothesis Tests.

Assessments: Homework, Unit Test, Quizzes, Project: Comparing Two Studies.

Correlation and Regression 3 Weeks

Key Concepts: Introduction to Linear Correlation the Types of Correlation, Defining independent and Dependent Variables, Finding a Correlation Coefficient, Performing a Hypothesis Test For a Population Correlation Coefficient, Finding the Equation of a Regression Line, Predicting Y-Values Using a Regression Equation, Interpreting the Three Types of Variation About a Regression Line, Finding and interpreting the Coefficient of Determination, Finding and interpreting the Standard Error of Estimate for a Regression Line, Constructing and interpreting a Prediction interval For Y, Using Technology to Find a Multiple Regression Equation, Using Technology to Find the Standard

Error Estimate, Using Technology to Find the Coefficient of Determination, Using a Multiple Regression Equation to Predict Y-Values.
Assessments: Homework, Unit Test, Quizzes, Project: Linear Regression Activity

Chi-Square Tests and the F-Distribution 3 Weeks
Key Concepts: Interpreting the Chi-Square Distribution, Using a Chi-Square Distribution Table, Using the Chi-Square Distribution to Construct a Confidence interval, Finding Critical Values For a X^{2-}Test, Using the X^{2-}Test to Test a Variance or a Standard Deviation, Using the Chi-Square Distribution to Test Frequency Distributions, Using a Contingency Table to Find Expected Frequencies, Using a Chi-Square Distribution to Test Whether Variables are independent, interpreting the F-Distribution, Using the F-Table to Find Critical Values, Performing a Two-Sample F-Test to Compare Two Variances, Using One-Way Analysis of Variance to Test Claims involving Three or Four Means, Introducing a Two-Way Analysis of Variance.
Assessments: Homework, Unit Test, Quizzes.
Biblical Integration: Writing Across the Curriculum assignment on a chosen mathematician; his or her world view compared and contrasted with Christian world view.