



Radnor High School  
Course Syllabus



Advanced Placement Statistics

**0470**

**Credits: 1.0**

**Weighted:**

**Length: 1 year**

**Grades: 11, 12**

**Prerequisite: Honors Algebra 2 or teacher rec.**

**Format: Meets Daily**

*I. Overall Description of Course*

AP Statistics is an Honor level course.

**Honors level** courses are intended for the motivated math student who is very good with mathematics but needs more teacher guidance to assist in the mastery of the material. The course will involve accelerated pacing and a demanding workload with some written explanations expected.

AP Statistics introduces students to the major concepts and tools for collecting, analyzing and drawing conclusions from data and exposes them to four broad concepts: exploring data for patterns and departures from patterns, sampling and experimentation in planning and conducting a study, anticipating patterns while exploring random phenomena using probability and simulation, and statistical inference - estimating population parameters and testing hypotheses. Students who successfully complete this course and the College Board AP Statistics examination may receive advanced credit for one semester of introductory college statistics. A graphing calculator is required.

**MARKING PERIOD ONE**

**UNIT: 1—Looking at Data Distributions (Chapter 1)**

**Student Objectives:**

At the conclusion of this chapter, students should be able successfully complete the following skills:

- Identify different types of variables, categorical or quantitative.
- Construct a frequency table.
- Construct the following graphical displays (with and without technology):
  - histogram and relative frequency histogram.
  - stem and leaf plot.
  - dot plot.
  - pie graph.
  - bar graphs.
  - time series plot.
- Using a graphical display describe the distribution of a variable, commenting on overall shape, center, spread and outliers.
- Compute the measures of center, mean and median .
- Compute the measures of spread, quartiles, interquartile range, variance and standard

deviation.

- Compute a five-number summary.
- Construct and interpret a boxplot.
- Apply linear transformations on measures of center and spread.
- Know the characteristics of the normal curve and the 68-95-99.7 rule.
- Compute standardized values of a z-score.
- Compute and interpret normal quantile plot.
- Use the standard normal distribution to compute a percentile of a normally distributed variable.
- Use the standard normal distribution to compute the value of a normally distributed variable for a given percentile.

### **Materials & Texts**

Moore, David S., McCabe, George P. Mario F. (1999). *Introduction to the Practice of Statistics*. New York, NY: W.H. Freeman.

### **Activities, Assignments, & Assessments**

#### **ACTIVITIES**

- 1.1 Displaying Distributions with Graphs
- 1.2 Describing Distributions with Numbers
- 1.3 The Normal Distributions

#### **ASSIGNMENTS**

Assignment sheets will be distributed periodically throughout the school year. Homework will be assigned on a daily basis. Individual assignments for each chapter can be viewed on the Mathematics Department page of Radnor High School's web site.

#### **ASSESSMENTS**

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- Lesson Assessments/Quizzes
- Chapter Tests

### **Terminology**

- Variable, categorical, quantitative, frequencies, distribution, relative frequencies, bar graphs, pie charts, stemplot, histogram, shape, center, spread, outliers, deviations, symmetric, skewed, mode, time plot, mean, median, quartiles, interquartile range, boxplot, variance, standard deviation, resistant measure, density curve, normal distribution, standard normal distribution, z-score, normal quantile plot

### **Media, Technology, Web Resources**

- TI-83/84 Calculator

## UNIT: 2—Looking at Data Relationships (Chapter 2)

### **Student Objectives:**

At the conclusion of this chapter, students should be able successfully complete the following skills:

- Construct and interpret scatterplots.
- Compute and interpret correlation,  $r$ , between two quantitative variables.
- Know the properties of correlation,  $r$ .
- Use technology to compute a least-squares regression line.
- Use a least-squares regression line to predict a response variable value for a given explanatory variable value.
- Interpret the slope and intercept of a least-squares regression line.
- Compute and interpret  $r^2$ .
- Compute a residuals.
- Construct and interpret residual plots.
- Understand the concept of lurking variables, outliers and influential observations.
- Use logarithms to transform data to fit a linear model.
- Understand and apply the concepts of causation, common response and confounding associations between variables.

### **Materials & Texts**

Moore, David S., McCabe, George P. Mario F. (1999). *Introduction to the Practice of Statistics*. New York, NY: W.H. Freeman.

### **Activities, Assignments, & Assessments**

#### **ACTIVITIES**

- 2.1 Scatterplots
- 2.2 Correlation
- 2.3 Least-Squares Regression
- 2.4 Cautions about Correlation and Regression
- 2.5 Logarithmic Transformation
- 2.7 The Question of Causation

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- Lesson Assessments/Quizzes
- Chapter Tests

### **Terminology**

- Explanatory variable, response variable, scatterplot, form, direction, strength, correlation, least-squares regression line, extrapolation, slope, intercept, residuals, lurking variables, influential observation, cause-and-effect, causation, common response, confounding.

### **Media, Technology, Web Resources**

- TI-83/84 Calculator

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### **Activities, Assignments, & Assessments**

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- Lesson Assessments/Quizzes
- Chapter Tests

### ***Terminology***

- Explanatory variable, response variable, scatterplot, form, direction, strength, correlation, least-squares regression line, extrapolation, slope, intercept, residuals, lurking variables, influential observation, cause-and-effect, causation, common response, confounding.

### ***Media, Technology, Web Resources***

- TI-83/84 Calculator

## **MARKING PERIOD TWO**

### **UNIT: 3—Producing Data (Chapter 3)**

#### ***Student Objectives:***

At the conclusion of this chapter, students should be able successfully complete the following skills:

- Understand the difference between an experiment and an observational study.
- Identify experimental units, subjects, factors, levels and treatments.
- Understand the term bias as it applies to sampling.
- Know and use the principles of experimental design to outline a randomized experiment.
- Understand the concept of statistical significance.
- Use random number tables and a calculator random number generator.
- Understand the concepts of double-blind, block and matched-pairs designs.
- Know and identify the different sampling techniques: Simple Random Sample, Stratified, Systematic, Cluster and Multi-Stage Sampling.
- Be aware of the cautions of sampling: Response Bias, Voluntary response, Undercoverage and nonresponse.
- Investigate random phenomena by means of simulation.

## **Materials & Texts**

Moore, David S., McCabe, George P. Mario F. (1999). *Introduction to the Practice of Statistics*. New York, NY: W.H. Freeman.

## **Activities, Assignments, & Assessments**

### **ACTIVITIES**

- 3.1 Fist Steps with Sampling
- 3.2 Design of Experiments
- 3.3 Sampling Design
- 3.4 Simulations

### **ASSIGNMENTS**

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- Lesson Assessments/Quizzes
- Chapter Tests

## **Terminology**

- Anecdotal evidence, Sampling, experiments, observational studies, treatments, experimental units, levels, factors, control, replication, randomization, comparison, confounding, bias, double-blind, block, matched pairs, sample, population, simple random sample, stratified, systematic, cluster sampling, multi-stage, voluntary response, undercoverage, nonresponse, response bias, simulation.

## **Media, Technology, Web Resources**

- TI-83/84 Calculator

## **UNIT: 4—Probability: the Study of Randomness Data (Chapter 4)**

### ***Student Objectives:***

At the conclusion of this chapter, students should be able successfully complete the following skills:

- Understand the concepts of random phenomenon and probability.
- Understand the difference between independent and dependent events.
- Identify if events are disjoint.
- Compute probabilities using the definition, complement rule, addition rule, and multiplication rule.
- Create a probability distribution of a discrete random variable.

- Compute the mean, variance, and standard deviation for a discrete random variable.
- Use the rules for means and variances when transforming or combining variables.
- Compute conditional probability.

### **Materials & Texts**

Moore, David S., McCabe, George P. Mario F. (1999). *Introduction to the Practice of Statistics*. New York, NY: W.H. Freeman.

### **Activities, Assignments, & Assessments**

#### **ACTIVITIES**

- 4.1 Randomness
- 4.2 Probability Models
- 4.3 Random Variables
- 4.4 Means and Variances Random Variables
- 4.5 General Probability Rules

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- Lesson Assessments/Quizzes
- Chapter Tests

### **Terminology**

- **Random Phenomenon, probability, event, sample space, independent events, complement, disjoint, dependent events, addition rule, multiplication rule, complement rule, random variable, probability distribution, discrete random variable, continuous random variable, density curve, conditional probability.**

### **Media, Technology, Web Resources**

- TI-83/84 Calculator

## **UNIT: 5—From Probability to Inference (Chapter 5)**

### **Student Objectives:**

At the conclusion of this chapter, students should be able successfully complete the following skills:

- Know and apply the properties of a binomial setting.
- Compute probabilities using the binomial distribution.
- Compute the mean and standard deviation of a binomial variable.
- Compute the mean and standard deviation of a sample proportion.
- Use the normal distribution to approximate the probability a binomial event.
- Use the continuity correction to increase the accuracy of the normal approximation.
- Use the binomial probability formula to compute the probability of exactly  $x$  successes of a binomial event.
- Compute the mean and standard deviation of a sample mean.
- Create a sampling distribution of a sample mean.
- Understand and apply the central limit theorem.

### **Materials & Texts**

Moore, David S., McCabe, George P. Mario F. (1999). *Introduction to the Practice of Statistics*. New York, NY: W.H. Freeman.

### **Activities, Assignments, & Assessments**

#### **ACTIVITIES**

- 5.1 Sampling Distributions for Counts and Proportions
- 5.2 The Sampling Distribution of a Sample Mean

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#### **ASSESSMENTS**

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- Lesson Assessments/Quizzes
- Chapter Tests

### **Terminology**

- **Binomial Distribution, sample proportion, success, normal approximation, binomial probability formula, continuity correction, factorial, sample mean, central limit theorem.**

### **Media, Technology, Web Resources**

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## **UNIT: 5—From Probability to Inference (Chapter 5)**

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At the conclusion of this chapter, students should be able successfully complete the following skills:

- Know and apply the properties of a binomial setting.
- Compute probabilities using the binomial distribution.
- Compute the mean and standard deviation of a binomial variable.
- Compute the mean and standard deviation of a sample proportion.
- Use the normal distribution to approximate the probability a binomial event.
- Use the continuity correction to increase the accuracy of the normal approximation.
- Use the binomial probability formula to compute the probability of exactly  $x$  successes of a binomial event.
- Compute the mean and standard deviation of a sample mean.
- Create a sampling distribution of a sample mean.
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- Lesson Assessments/Quizzes
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### **Terminology**

- **Binomial Distribution, sample proportion, success, normal approximation, binomial probability formula, continuity correction, factorial, sample mean, central limit theorem.**

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