AP® Statistics

Syllabus

Curricular Requirements

CR1	Students and teachers have access to a college-level statistics textbook or resource in print or electronic format.	See page: 1
CR2	The course provides opportunities for students to interpret standard computer output and use approved graphing calculators with statistical computational capabilities to describe data, determine probabilities, and perform tests.	See pages: 2, 5
CR3	The course provides opportunities to develop student understanding of the required content outlined in each unit described in the AP® Course and Exam Description (CED).	See page: 1
CR4	The course provides opportunities for students to develop the skills related to Statistical Practice 1: Formulate Questions, as outlined in the CED.	See pages: 4, 5
CR5	The course provides opportunities for students to develop the skills related to Statistical Practice 2: Collect Data, as outlined in the CED.	See pages: 2-5
CR6	The course provides opportunities for students to develop the skills related to Statistical Practice 3: Analyze Data, as outlined in the CED.	See pages: 2-4
CR7	The course provides opportunities for students to develop the course skills related to Statistical Practice 4: Interpret Results, as outlined in the CED.	See page: 4

Course Description

AP Statistics is a year-long, introductory college-level course designed to prepare students for the Advanced Placement (AP) Statistics exam. Over the course of 11 units, organized according to five main topics, students will develop knowledge around the four Statistical Practices, with an opportunity to practice and prepare for the exam in Unit 12. **CR3**

- Practice 1: Formulate Questions
- Practice 2: Collect Data
- Practice 3: Analyze Data
- Practice 4: Interpret Results

This content is presented in an online course where students view lectures from experienced, highly qualified instructors. Students receive continual feedback from instructors via phone calls, instant messages, emails, discussion threads, and live chats, as well as written feedback on their assignments. In addition, the teacher should provide instruction and coaching in calculator use, as needed.

This course is aligned to the College Board AP® Statistics course description introduced in 2026.

Course Materials

Textbook:

Starnes, Daren S., Tabor, Josh. The Updated Practice of Statistics, 6th ed., New York: W.H. Freeman & Co., 2020. **CR1**

Additional Resources:

- Students use a TI-84 graphing calculator and Desmos software to complete assignments, projects, and practice exam questions. **CR2**
- Students and teachers can find additional resources at apcentral.collegeboard.org. Students may access instructional supports, complete progress checks, and take practice exams.

Course Outline

One-Variable Data and Data Collection

Overview:

Over the course of two units, students learn to:

- Distinguish between categorical and quantitative data
- Represent categorical data in a table and graphically
- Construct different types of univariate plots
- Describe the shapes of distributions
- Compute measures of center and compare the pros/cons of each
- Compute measures of spread (variability) and compare the pros/cons of each
- Use applets and software to compare the different types of displays and how the choice of settings can affect the appearance of the distribution
- Compare distributions of univariate data using back-to-back stemplots or parallel boxplots

Statistical Practices and Skills: 1.A, 2.A, 2.B, 3.A, 3.B, 4.A, 4.B, 4.C

Example Activities:

1. Activity 1: Students analyze a dataset of a single quantitative variable (e.g., number of countries visited, annual rainfall amounts, or daily step counts) using publicly available data (3.A). Students calculate the five-number summary and construct multiple types of graphical displays (e.g., boxplot, histogram). Students then write a brief analysis comparing the benefits and limitations of each type of graph (4.A, 4.C). **CR6**
2. Activity 2: Students investigate different sampling methods by researching or using a provided dataset that includes samples collected using various techniques (e.g., simple random, convenience, and stratified samples) (2.B). Students analyze and construct appropriate graphical representations to compare the results from each sampling method (3.A, 4.A). Students then evaluate which sampling technique is most appropriate in the given context and justify why it is superior to the others (4.B, 4.C). **CR5** **CR6**

Probability, Random Variables, and Probability Distributions

Overview:

Over the course of four units, students will learn to:

- Apply methods of simulation to estimate probabilities
- Apply the addition rule to compute probabilities
- Apply the multiplication rule to compute probabilities
- Construct Venn diagrams to organize information
- Construct tree diagrams to organize conditional probabilities

- Compute conditional probabilities
- Determine whether events are independent and/or mutually exclusive
- Apply the vocabulary of probability distributions
- Construct probability distributions
- Apply the concept of expected value
- Recognize the binomial distribution and calculate the corresponding probabilities
- Use calculators for the binomial distributions (pdf and cdf)
- Calculate z-scores and use the standard normal distribution to make comparisons
- Apply the central limit theorem
- Conduct simulations (by hand and with an applet) to generate approximate sampling distributions of a statistic such as the sample mean, sample proportion, etc.
- Describe center, shape, and spread of the sampling distribution of the sample means

Statistical Practices and Skills: 3.A, 3.B, 3.C, 3.D, 4.A, 4.B, 4.C, 4.D

Example Activities:

1. Activity 1: Students work through exercises using data from social media usage to explore probabilities, including independence, mutually exclusive events, and conditional probability. **CR6**
2. Activity 2: Students construct sampling distributions of the sample means for the average daily step counts of adults using fitness tracker data (2.A). Sampling distributions for n = 5, n = 10, and n = 30 are constructed and compared by combining sample means from all students. Students then simulate finding means for thousands of repeated samples and examine the center, shape, and spread of the sampling distributions (3.A, 3.B, 3.C, 4.A). The statistics are then compared to the population parameters (4.C). **CR5** **CR6**

Inference for Categorical Data: Proportions

Overview:

Over the course of two units, students will learn to:

- Construct and interpret a confidence interval to estimate the proportion of success in a binomial population (formulaically and via a calculator)
- Conduct and interpret a test of significance to determine whether it is reasonable to conclude that the sample proportion could have been obtained by chance alone if the null were true
- Construct and interpret a confidence interval to estimate the difference in proportions of successes in two binomial populations (formulaically and via a calculator)
- Conduct and interpret a test of significance to determine whether it is reasonable to conclude that the difference in sample proportions from two binomial populations could have been obtained by chance alone if the null were true
- Conduct and interpret a chi-square test of homogeneity or independence
- Interpret computer output to conduct tests and construct confidence intervals using a calculator and software
- Discuss the importance of how the data were obtained
- Develop the understanding of the interpretation of a confidence interval and the level of confidence
- Develop an understanding of p-values and develop a conclusion by interpreting the p-value
- Develop an understanding of the concepts of power, Type I, and Type II errors

Statistical Practices and Skills: 1.A, 2.C, 2.D, 2.E, 3.C, 3.D, 3.E, 4.B, 4.C, 4.D, 4.E, 4.F, 4.G

Example Activities:

1. Activity 1: Students investigate whether people can correctly identify AI-generated vs. human-written text to

introduce significance tests. Students research or use a provided dataset (e.g., results from studies or online quizzes where participants classify text as AI or human). They then use a random number generator to simulate the distribution of the number of correct identifications based on random guessing (1.A). This simulation is used to estimate the probability of obtaining their observed result if responses were purely random (2.A, 2.E, 3.E, 4.B, 4.D, 4.E, 4.F, 4.G). CR5 CR6 CR7

2. Activity 2: Students begin by exploring publicly available datasets comparing two brands or categories (e.g., the proportion of electric vehicles among total car sales for two different companies). Working individually or in small groups, students formulate an investigative statistical question that can be answered by comparing population proportions, such as *"Is the proportion of electric vehicle sales higher for Company A than for Company B?"* or *"Do consumers choose Brand A more frequently than Brand B for a particular product category?"* Students justify why their question is statistical, identify the populations and variables of interest, and determine an appropriate alternative hypothesis (1.A). Students then determine an appropriate inference method by checking the necessary conditions (2.C, 4.E). Using the dataset, they calculate the sample proportions for each group (3.C, 3.D), compute the test statistic and p-value (3.E), and interpret the results in context to answer their original investigative question (4.F, 4.G). CR4 CR5 CR6 CR7

Inference for Quantitative Data: Means

Overview:

Over the course of two units, students will learn to:

- Construct and interpret a confidence interval to estimate a population mean (formulaically and via a calculator)
- Conduct and interpret a test of significance to determine whether it is reasonable to conclude that the sample mean could have been obtained by chance alone if the null were true
- Construct and interpret a confidence interval to estimate the difference in means from two populations (formulaically and via a calculator)
- Conduct and interpret a test of significance to determine whether it is reasonable to conclude that the difference in sample means from two populations could have been obtained by chance alone if the null were true
- Interpret computer output to conduct tests and construct confidence intervals using a calculator and software
- Discuss the importance of how the data were obtained to further understand the concepts of power, Type I, and Type II errors
- Further develop the understanding of the interpretation of a confidence interval and the level of confidence
- Further develop an understanding of p-values and develop a conclusion by interpreting the p-value
- Draw conclusions from an observational study and learn how these conclusions differ from those that can be drawn from a randomized experiment
- Link the design of an experiment to the type of analysis and the conclusions that can be drawn

Statistical Practices and Skills: 1.A, 2.C, 2.D, 2.E, 3.D, 3.E, 4.C, 4.D, 4.E, 4.F, 4.G

Example Activities:

1. Activity 1: Matched Pairs Activity. Students investigate differences in performance using paired data they collect or access (e.g., comparing their typing speed on a keyboard vs. touchscreen, or their completion time for a task with and without a tool like autocorrect) (1.A, 2.A). Students record paired measurements and conduct a complete significance test for the mean difference. They interpret confidence intervals or p-values from the test (4.F) and draw conclusions about the investigative question based on the statistical inference results (4.G). CR7
2. Activity 2: Students begin by exploring datasets representing prices for similar items from an online retailer and a brick-and-mortar retailer (e.g., data collected from publicly available websites). Students formulate an investigative statistical question related to comparing average prices between the two retailer types, such as *"Do online retailers tend to offer lower average prices than brick-and-mortar retailers for similar products?"* or *"How much evidence is there that the mean price of a product differs between online and in-store retailers?"*

Students justify why their question is statistical by recognizing that price data vary across products and retailers and that conclusions must be based on data from a sample rather than every possible item (1.A). Students identify the populations and variables of interest and determine whether their question can be answered using a confidence interval for the difference in population means. They then compare the two distributions and check conditions to determine whether it is appropriate to construct a confidence interval for the difference in means (4.E). Students calculate and interpret the confidence interval and use the results to answer their original investigative question and justify a claim about price differences between the two types of retailers (4.G). **CR4** **CR7**

Regression Analysis

Overview:

Over the course of one unit, students will learn to:

- Analyze patterns in scatterplots and describe the pattern
- Find and interpret in context the regression line through an elliptical pattern of data points
- Use correlation to determine the measure of spread of the points from the line
- Use their approved graphing calculator or applet to create scatterplots, to calculate and plot regression lines, and to construct and interpret residual plots
- Interpret standard computer output from the textbook

Statistical Practices and Skills: 3.A, 3.B, 4.A, 4.B, 4.D

Example Activities:

1. Activity 1: Students analyze a dataset of two quantitative variables (e.g., hours spent studying vs. test scores, or daily screen time vs. hours of sleep) using publicly available data (2.A). Students create a scatterplot and calculate the correlation coefficient using technology (4.A). **CR5**
2. Activity 2: Students analyze a dataset of two quantitative variables (e.g., average daily temperature vs. energy consumption, or advertising spending vs. product sales) using publicly available data (2.A). Students create a scatterplot, describe the form, direction, and strength of the relationship, and calculate the correlation coefficient using technology (4.A). **CR2** **CR4** **CR5**

Preparing for the Exam

Overview:

Unit 12 is a review unit consisting of short lessons revisiting major concepts from each of the previous units. Students will then take two full-length practice exams that include both multiple-choice and free-response questions (including analysis, explanation, and justification).