

Wilson Area School District Planned Course Guide

Title of Planned Course: AP Statistics

Subject Area: Mathematics

Grade Level: 10 - 12

Course Description: *Prerequisites: Honors Algebra II and Honors Geometry with a grade of 85 or better.*

AP Statistics is designed to be an interactive, thought provoking course which allows one to construct one's own understanding of concepts and techniques of statistics. As such, students will be pushed to think at a higher level. One will learn how to make connections between all aspects of the statistical process, including design, analysis, and conclusions. Students will be responsible for communicating methods, results, and interpretations using the correct vocabulary. AP Statistics is a year-long introductory course to statistics designed for students who have successfully completed Geometry Honors and Algebra II Honors. The purpose of this AP course is to introduce students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Students will explore and analyze data using graphical and numerical techniques. Students will also use probability and statistical inferences to develop an appropriate model for data collecting. AP Statistics can be taken alone or in conjunction with Honors Pre-calculus, Honors Calculus, or Calculus AB, or Calculus BC. (Course requirements include: tests, quizzes, projects, presentations, daily homework, and usage of calculators.) It is highly recommended that each student have a TI – 84+C calculator.

Time/Credit for this Course: One Full Academic Year / 1 credit

Curriculum Writing Committee: Michael Browne

Curriculum Map

August:

Basic Statistics and data analysis (1-2 weeks)

September:

Basic Statistics and data analysis (cont.)

Exploring and Understanding Data (5-7 weeks)

October:

Exploring and Understanding Data (cont.)

Exploring Relationships Between Variables (5-7 weeks)

November:

Exploring Relationships Between Variables (cont.)

Gathering Data (4-6 weeks)

December:

Gathering Data (cont.)

Randomness and Probability (5-7 weeks)

January:

Randomness and Probability (cont.)

From the Data at Hand to the World at Large (5-7 weeks)

February:

From the Data at Hand to the World at Large (cont.)

Learning About the World (2-3 weeks)

March:

Learning About the World (cont.)

Inference When Variables are Related (2-3 weeks)

April:

Inference When Variables are Related (cont.)

Review for Final AP Exam (2-3 weeks)

May:

Review for Final AP Exam (cont.)

Cumulative Projects (2-4 weeks)

Wilson Area School District Planned Course Materials

Course Title: AP Statistics

Textbook:

Stats: Modeling the World, 6th edition
Bock, David E., Velleman, Paul F., DeVeaux, Richard D., Bullard, Floyd
Addison-Wesley, 2010

Supplemental Books:

- *The Practice of Statistics*, 6th edition
Starnes, Daren S., Taber, Josh
W. H. Freeman and Company, 2020
- *Understanding Basic Statistics*, 9th edition
Brase, Charles Henry and Brase, Corrinne Pellillo
Brooks-Cole, 2021
- *Introduction to the Practice of Statistics*, 10th edition
Moore, David S., McCabe, George P., and Craig, Bruce A.
W. H. Freeman and Company, 2020
- *Statistics, from Data to Decision*, 6th edition
Watkins, Ann E., Scheaffer, Richard L., and Cobb, George W.
John Wiley and Sons, Inc., 2019

Teacher Resources:

- Textbooks
- AP Statistics summer workshop workbooks
- Worksheets
- Internet
- College Board course questions
- Teacher created worksheets
- Past AP open ended and multiple choice questions (released)

Curriculum Scope & Sequence

Planned Course: AP Statistics

Unit 1: Basic Statistics and data Analysis

Time frame: 1 - 2 Weeks

Essential content: At the end of this unit, students will be able to:

- Recall statistics they have learned throughout high school
- Collect simple data from given and observed statistics

Core Activities: Students will complete/participate in the following:

- Define key terms relating to Statistics
- Complete examples of problems in class
- Participate in individual, pair, and small group practice of concepts
- Complete hands-on activity to discover knowledge

Extensions: Work with more challenging patterns and problems in class and for homework

Remediation:

- Additional exercises
- Chapter review exercises which revisits concepts and vocabulary
- Teacher help before and after school
- Peer tutoring

Instructional Methods:

- Smart ® notes
- Higher order thinking questions
- Individual, pair, and small group practice
- Warm ups
- Teacher directed examples
- Released AP Exam questions
- College Board Problems

Materials & Resources:

- Warm Ups
- Textbook
- TI 84+ Color
- Notes/examples
- Handouts (worksheets)
- Activity supplies

Assessments:

- Warm Ups
- Teacher observation of student work
- Homework assignments
- Test/quizzes
- Group assignments
- Reading Textbook and taking own notes
- Pre-Chapter Quizzes

Curriculum Scope & Sequence

Planned Course: AP Statistics

Unit 2: Basic Statistics and data Analysis

Time frame: 5 – 7 Weeks

Essential content: At the end of this unit, students will be able to:

- Describe and display categorical data
- Discussion independence
- Describe and display quantitative data
- Summarize statistics for quantitative data
- Describe Outliers
- Describe the normal distribution
- Explain the effect of linear transformations to data sets on summary statistics
 - To include but not limited to: boxplots, dotplots, stem plots, back-to-back stem plots, histograms, frequency plots, and parallel boxplots.
- Create a Histogram using TI 83/84 calculator
- Create a boxplot, find the five number summary, calculate the mean and standard deviation using TI 83/84 calculator

Core Activities: Students will complete/participate in the following:

- Define key terms relating to Statistics
- Complete examples of problems in class
- Participate in individual, pair, and small group practice of concepts
- Complete hands-on activity to discover knowledge

Extensions: Work with more challenging patterns and problems in class and for homework

Remediation:

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- Activity supplies

Assessments:

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Curriculum Scope & Sequence

Planned Course: AP Statistics

Unit 3: Exploring and Understanding Data

Time frame: 5 – 7 Weeks

Essential content: At the end of this unit, students will be able to:

- Display and describe scatterplots
- Describe regression
- Analyze two-variable quantitative data:
 - Correlation and the coefficient of determination
 - Least-squares regression
 - Slope and y-intercept
 - Residuals and residual plots
 - Outliers and influential points
- Explain transformations to achieve linearity
- Create a scatterplot and calculate correlation using TI 83/84 calculator
- Find the LSRL, add a line to a graph of datapoints, and create a residual plot using TI 83/84 calculator

Core Activities: Students will complete/participate in the following:

- Define key terms relating to Statistics
- Complete examples of problems in class
- Participate in individual, pair, and small group practice of concepts
- Complete hands-on activity to discover knowledge

Extensions: Work with more challenging patterns and problems in class and for homework

Remediation:

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Curriculum Scope & Sequence

Planned Course: AP Statistics

Unit 4: Gathering Data

Time frame: 4 – 6 Weeks

Essential content: At the end of this unit, students will be able to

- Design surveys via various methods
- Describe bias in surveys
- Explain randomization and representative samples
- Describe experimental design:
 - Control
 - Random assignment of treatment
 - Replication
 - Placebo & blinding
 - Blocking and matched pairs
 - Confounding and lurking variables
 - Statistically significant difference (introduction)
- Demonstrate observational studies

Core Activities: Students will complete/participate in the following:

- Define key terms relating to Statistics
- Complete examples of problems in class
- Participate in individual, pair, and small group practice of concepts
- Complete hands-on activity to discover knowledge

Extensions: Work with more challenging patterns and problems in class and for homework

Remediation:

- Additional exercises
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Instructional Methods:

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Curriculum Scope & Sequence

Planned Course: AP Statistics

Unit 5: Randomness and Probability

Time frame: 5 – 7 Weeks

Essential content: At the end of this unit, students will be able to

- Define basic probability principles including complement, independence and mutually exclusive
- Simulate probability scenarios
- Use addition, multiplication and conditional probability rules
- Describe random variables:
 - Expected value and standard deviation
 - Rules for transforming and combining random variables
- Perform binomial and geometric distributions
- Demonstrate sampling distributions for means and proportions
- Calculate geometric probabilities and calculate binomial probabilities using TI 83/84 calculator
- Compute mean and standard deviation for probability models using TI83/84 calculator

Core Activities: Students will complete/participate in the following:

- Define key terms relating to Statistics
- Complete examples of problems in class
- Participate in individual, pair, and small group practice of concepts
- Complete hands-on activity to discover knowledge

Extensions: Work with more challenging patterns and problems in class and for homework

Remediation:

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Curriculum Scope & Sequence

Planned Course: AP Statistics

Unit 6: From the Data at Hand to the World at Large

Time frame: 5 – 7 Weeks

Essential content: Topics of the unit:

- Determine confidence intervals for one and two proportions
- Perform hypothesis testing for one and two proportions
- Describe type I and II errors and power
- Calculate a one-proportion Z-interval using TI 83/84 calculator
- Calculate a one-proportion Z-test using TI 83/84 calculator
- Calculate a two-proportion Z-interval, calculating a two-proportion Z-test using TI 83/84 calculator

Core Activities: Students will complete/participate in the following:

- Define key terms relating to Statistics
- Complete examples of problems in class
- Participate in individual, pair, and small group practice of concepts
- Complete hands-on activity to discover knowledge

Extensions: Work with more challenging patterns and problems in class and for homework

Remediation:

- Additional exercises
- Chapter review exercises which revisits concepts and vocabulary
- Teacher help before and after school
- Peer tutoring

Instructional Methods:

- Smart ® notes
- Higher order thinking questions
- Individual, pair, and small group practice
- Warm ups
- Teacher directed examples
- Released AP Exam questions
- College Board Problems

Materials & Resources:

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- Handouts (worksheets)
- Activity supplies

Assessments:

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- Group assignments
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Curriculum Scope & Sequence

Planned Course: AP Statistics

Unit 7: Learning About the World through statistics

Time frame: 2 – 3 Weeks

Essential content: At the end of this unit, students will be able to:

- Describe confidence intervals for one and two means (with t)
- Perform hypothesis testing for one and two means (with t)
- Determine confidence intervals and hypothesis testing for matched pairs means (with t)
- Show inferences for means
- Calculate probabilities for the T-distribution, calculate a one-sample T-interval, Calculate a one-sample T-test using TI 83/84 calculator
- Calculate a two-sample T-interval for unpaired means, calculate a two-sample T-test for unpaired means using TI 83/84 calculator
- Create a matched-pairs T-interval for means, conduct a matched-pairs T-test for means using TI 83/84 calculator

Core Activities: Students will complete/participate in the following:

- Define key terms relating to Statistics
- Complete examples of problems in class
- Participate in individual, pair, and small group practice of concepts
- Complete hands-on activity to discover knowledge

Extensions: Work with more challenging patterns and problems in class and for homework

Remediation:

- Additional exercises
- Chapter review exercises which revisits concepts and vocabulary
- Teacher help before and after school
- Peer tutoring

Instructional Methods:

- Smart ® notes
- Higher order thinking questions
- Individual, pair, and small group practice
- Warm ups
- Teacher directed examples
- Released AP Exam questions
- College Board Problems

Materials & Resources:

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- Textbook
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- Notes/examples
- Handouts (worksheets)
- Activity supplies

Assessments:

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- Group assignments
- Reading Textbook and taking own notes
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Curriculum Scope & Sequence

Planned Course: AP Statistics

Unit 8: Inference When Variables are Related

Time frame: 2 – 3 Weeks

Essential content: At the end of this unit, students will be able to:

- Describe chi-square goodness-of-fit
- Describe chi-square for homogeneity and for independence
- Describe confidence interval for slope
- Describe hypothesis testing for slope
- Calculate a chi-square test for goodness of fit, calculate a chi-square test for a table using TI 83/84 calculator
- Calculate a t-interval for the slope, calculate a t-test for the slope using TI 83/84 calculator

Core Activities: Students will complete/participate in the following:

- Define key terms relating to Statistics
- Complete examples of problems in class
- Participate in individual, pair, and small group practice of concepts
- Complete hands-on activity to discover knowledge

Extensions: Work with more challenging patterns and problems in class and for homework

Remediation:

- Additional exercises
- Chapter review exercises which revisits concepts and vocabulary
- Teacher help before and after school
- Peer tutoring

Instructional Methods:

- Smart ® notes
- Higher order thinking questions
- Individual, pair, and small group practice
- Warm ups
- Teacher directed examples
- Released AP Exam questions
- College Board Problems

Materials & Resources:

- Warm Ups
- Textbook
- TI 84+ Color
- Notes/examples
- Handouts (worksheets)
- Activity supplies

Assessments:

- Warm Ups
- Teacher observation of student work
- Homework assignments
- Test/quizzes
- Group assignments
- Reading Textbook and taking own notes
- Pre-Chapter Quizzes

Curriculum Scope & Sequence

Planned Course: AP Statistics

Unit 9: Review for Final AP Exam

Time frame: 2 – 3 Weeks

Essential content: At the end of this unit, students will be able to:

- Review concepts and complete the AP exam
- Review as many concepts as possible using the TI 83/84 calculator

Core Activities: Students will complete/participate in the following:

- Define key terms relating to Statistics
- Complete examples of problems in class
- Participate in individual, pair, and small group practice of concepts
- Complete hands-on activity to discover knowledge

Extensions: Work with more challenging patterns and problems in class and for homework

Remediation:

- Additional exercises
- Chapter review exercises which revisits concepts and vocabulary
- Teacher help before and after school
- Peer tutoring

Instructional Methods:

- Smart ® notes
- Higher order thinking questions
- Individual, pair, and small group practice
- Warm ups
- Teacher directed examples
- Released AP Exam questions
- College Board Problems

Materials & Resources:

- Warm Ups
- Textbook
- TI 84+ Color
- Notes/examples
- Handouts (worksheets)
- Activity supplies

Assessments:

- Warm Ups
- Teacher observation of student work
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- Test/quizzes
- Group assignments
- Reading Textbook and taking own notes
- Pre-Chapter Quizzes

Curriculum Scope & Sequence

Planned Course: AP Statistics

Unit 10: Cumulative projects

Time frame: 2 – 4 Weeks

Essential content: At the end of this unit, students will be able to:

- Utilize objectives from the course in a statistical project

Core Activities: Students will complete/participate in the following:

- Define key terms relating to Statistics
- Complete examples of problems in class
- Participate in individual, pair, and small group practice of concepts
- Complete hands-on activity to discover knowledge

Extensions: Work with more challenging patterns and problems in class and for homework

Instructional Methods:

- Smart ® notes
- Higher order thinking questions
- Individual, pair, and small group practice
- TI NSpire

Materials & Resources:

- Warm Ups
- Textbook
- TI 84+ Color
- Notes/examples
- Handouts (worksheets)
- Activity supplies

Assessments:

- Warm Ups
- Teacher observation of student work
- Group assignments