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AP STATISTICS

Course Content

Based on the Understanding by Design® (Wiggins and McTighe) model, this course framework provides a clear and detailed description of the course requirements necessary for student success. The framework specifies what students must know, be able to do, and understand, with a focus on three big ideas that encompass the principles and processes in the discipline of statistics. The framework also encourages instruction that prepares students for advanced coursework in statistics or other fields using statistical reasoning and for active, informed engagement with a world of data to be interpreted appropriately and applied wisely to make informed decisions.

Big Ideas

The big ideas serve as the foundation of the course and allow students to create meaningful connections among concepts. They are often overarching concepts or themes that become threads that run throughout the course. Revisiting the big ideas and applying them in a variety of contexts allows students to develop deeper conceptual understanding. Below are the big ideas of the course and a brief description of each.

BIG IDEA 1: VARIATION AND DISTRIBUTION (VAR)

The distribution of measures for individuals within a sample or population describes variation. The value of a statistic varies from sample to sample. How can we determine whether differences between measures represent random variation or meaningful distinctions? Statistical methods based on probabilistic reasoning provide the basis for shared understandings about variation and about the likelihood that variation between and among measures, samples, and populations is random or meaningful.

BIG IDEA 2: PATTERNS AND UNCERTAINTY (UNC)

Statistical tools allow us to represent and describe patterns in data and to classify departures from patterns. Simulation and probabilistic reasoning allow us to anticipate patterns in data and to determine the likelihood of errors in inference.

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BIG IDEA 3: DATA-BASED PREDICTIONS, DECISIONS, AND CONCLUSIONS (DAT)

Data-based regression models describe relationships between variables and are a tool for making predictions for values of a response variable. Collecting data using random sampling or randomized experimental design means that findings may be generalized to the part of the population from which the selection was made. Statistical inference allows us to make data-based decisions.

UNITS

The course content is organized into commonly taught units. The units have been arranged in a logical sequence frequently found in many college courses and textbooks.

The nine units in AP Statistics, and their weighting on the multiple-choice section of the AP Exam, are listed below.

Pacing recommendations at the unit level and on the Course at a Glance provide suggestions for how to teach the required course content and administer the Personal Progress Checks. The suggested class periods are based on a schedule in which the class meets five days a week for 45 minutes each day. While these recommendations have been made to aid planning, teachers should of course adjust the pacing based on the needs of their students, alternate schedules (e.g., block scheduling), or their school's academic calendar.

TOPICS

Each unit is broken down into teachable segments called topics. The topic pages (starting on p. 36) contain all required content for each topic.

Exam Weighting for the Multiple-Choice Section of the AP Exam

Units	Exam Weighting
Unit 1: Exploring One-Variable Data	**15–23%**
Unit 2: Exploring Two-Variable Data	**5–7%**
Unit 3: Collecting Data	**12–15%**
Unit 4: Probability, Random Variables, and Probability Distributions	**10–20%**
Unit 5: Sampling Distributions	**7–12%**
Unit 6: Inference for Categorical Data: Proportions	**12–15%**
Unit 7: Inference for Quantitative Data: Means	**10–18%**
Unit 8: Inference for Categorical Data: Chi-Square	**2–5%**
Unit 9: Inference for Quantitative Data: Slopes	**2–5%**

Spiraling the Big Ideas

The following table shows how the big ideas spiral across units.

Big Ideas	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9
	Exploring One-Variable Data	Exploring Two-Variable Data	Collecting Data	Probability, Random Variables, and Probability Distributions	Sampling Distributions	Inference for Categorical Data: Proportions	Inference for Quantitative Data: Means	Inference for Categorical Data: Chi-Square	Inference for Quantitative Data: Slopes
Variation and Distribution VAR	✓	✓	✓	✓	✓	✓	✓	✓	✓
Patterns and Uncertainty UNC	✓	✓		✓	✓	✓	✓		✓
Data-Based Predictions, Decisions, and Conclusions DAT		✓	✓			✓	✓	✓	✓

Course at a Glance

Plan

The Course at a Glance provides a useful visual organization of the AP Statistics curricular components, including:

- Sequence of units, along with approximate weighting and suggested pacing. Please note, pacing is based on 45-minute class periods, meeting five days each week for a full academic year.
- Progression of topics within each unit
- Spiraling of the big ideas and course skills across units

Teach

SKILL CATEGORIES

Skill categories spiral throughout the course.

- 1 Selecting Statistical Methods
- 2 Data Analysis
- 3 Using Probability and Simulation
- 4 Statistical Argumentation

+ Indicates 3 or more skills for a given topic. See the individual topic for all the relevant skills.

BIG IDEAS

Big ideas spiral across topics and units.

- VAR Variation and Distribution
- UNC Patterns and Uncertainty
- DAT Data-Based Predictions, Decisions, and Conclusions

Assess

Assign the Personal Progress Checks—either as homework or in class—for each unit. Each Personal Progress Check contains formative multiple-choice and free-response questions. The feedback from the Personal Progress Checks shows students the areas where they need to focus.

UNIT 1 Exploring One-Variable Data

~14–16 Class Periods | **15–23%** AP Exam Weighting

VAR 1	1.1	Introducing Statistics: What Can We Learn from Data?
VAR 2	1.2	The Language of Variation: Variables
UNC 2	1.3	Representing a Categorical Variable with Tables
UNC 2	1.4	Representing a Categorical Variable with Graphs
UNC 2	1.5	Representing a Quantitative Variable with Graphs
UNC 2	1.6	Describing the Distribution of a Quantitative Variable
UNC 2 4	1.7	Summary Statistics for a Quantitative Variable
UNC 2	1.8	Graphical Representations of Summary Statistics
UNC 2	1.9	Comparing Distributions of a Quantitative Variable
VAR 2 3	1.10	The Normal Distribution

Personal Progress Check 1

Multiple-choice: ~35 questions
Free-response: 2 questions
- Exploring Data
- Exploring Data

UNIT 2 Exploring Two-Variable Data

~10–11 Class Periods | **5–7%** AP Exam Weighting

VAR 1	2.1	Introducing Statistics: Are Variables Related?
UNC 2	2.2	Representing Two Categorical Variables
UNC 2	2.3	Statistics for Two Categorical Variables
UNC DAT 2	2.4	Representing the Relationship Between Two Quantitative Variables
DAT 2 4	2.5	Correlation
DAT 2	2.6	Linear Regression Models
DAT 2	2.7	Residuals
DAT 2 4	2.8	Least Squares Regression
DAT 2	2.9	Analyzing Departures from Linearity

Personal Progress Check 2

Multiple-choice: ~35 questions
Free-response: 2 questions
- Exploring Data
- Investigative Task

UNIT 3 Collecting Data

~9–10 Class Periods | **12–15%** AP Exam Weighting

VAR 1	3.1	Introducing Statistics: Do the Data We Collected Tell the Truth?
DAT 1 4	3.2	Introduction to Planning a Study
DAT 1	3.3	Random Sampling and Data Collection
DAT 1	3.4	Potential Problems with Sampling
VAR 1	3.5	Introduction to Experimental Design
VAR 1	3.6	Selecting an Experimental Design
VAR 4	3.7	Inference and Experiments

Personal Progress Check 3

Multiple-choice: ~20 questions
Free-response: 2 questions
- Exploring Data and Collecting Data
- Collecting Data

UNIT 4 Probability, Random Variables, and Probability Distributions

~18–20 Class Periods | **10–20%** AP Exam Weighting

VAR 1	4.1	Introducing Statistics: Random and Non-Random Patterns?
UNC 3	4.2	Estimating Probabilities Using Simulation
VAR 3 4	4.3	Introduction to Probability
VAR 4	4.4	Mutually Exclusive Events
VAR 3	4.5	Conditional Probability
VAR 3	4.6	Independent Events and Unions of Events
VAR 2 4	4.7	Introduction to Random Variables and Probability Distributions
VAR 3 4	4.8	Mean and Standard Deviation of Random Variables
VAR 3	4.9	Combining Random Variables
UNC 3	4.10	Introduction to the Binomial Distribution
UNC 3 4	4.11	Parameters for a Binomial Distribution
UNC 3 4	4.12	The Geometric Distribution

Personal Progress Check 4

Multiple-choice: ~45 questions
Free-response: 2 questions
- Probability
- Investigative Task

UNIT 5 Sampling Distributions

~10–12 Class Periods | **7–12%** AP Exam Weighting

VAR 1	5.1	Introducing Statistics: Why Is My Sample Not Like Yours?
VAR 3	5.2	The Normal Distribution, Revisited
UNC 3	5.3	The Central Limit Theorem
UNC 4 3	5.4	Biased and Unbiased Point Estimates
VAR 3 4	5.5	Sampling Distributions for Sample Proportions
UNC 3 4	5.6	Sampling Distributions for Differences in Sample Proportions
UNC 3 4	5.7	Sampling Distributions for Sample Means
UNC 3 4	5.8	Sampling Distributions for Differences in Sample Means

Personal Progress Check 5

Multiple-choice: ~35 questions
Free-response: 2 questions
- Probability and Sampling Distributions
- Investigative Task

UNIT 6 Inference for Categorical Data: Proportions

~16–18 Class Periods | **12–15%** AP Exam Weighting

- VAR 1 — **6.1** Introducing Statistics: Why Be Normal?
- UNC + — **6.2** Constructing a Confidence Interval for a Population Proportion
- UNC 4 — **6.3** Justifying a Claim Based on a Confidence Interval for a Population Proportion
- VAR 1 4 — **6.4** Setting Up a Test for a Population Proportion
- VAR DAT 3 4 — **6.5** Interpreting *p*-Values
- DAT 4 — **6.6** Concluding a Test for a Population Proportion
- UNC + — **6.7** Potential Errors When Performing Tests
- UNC + — **6.8** Confidence Intervals for the Difference of Two Proportions
- UNC 4 — **6.9** Justifying a Claim Based on a Confidence Interval for a Difference of Population Proportions
- VAR 1 4 — **6.10** Setting Up a Test for the Difference of Two Population Proportions
- VAR DAT 3 4 — **6.11** Carrying Out a Test for the Difference of Two Population Proportions

Personal Progress Check 6

Multiple-choice: ~55 questions
Free-response: 2 questions
- Inference
- Investigative Task

UNIT 7 Inference for Quantitative Data: Means

~14–16 Class Periods | **10–18%** AP Exam Weighting

- VAR 1 — **7.1** Introducing Statistics: Should I Worry About Error?
- VAR UNC + — **7.2** Constructing a Confidence Interval for a Population Mean
- UNC 4 — **7.3** Justifying a Claim About a Population Mean Based on a Confidence Interval
- VAR 1 4 — **7.4** Setting Up a Test for a Population Mean
- VAR DAT 3 4 — **7.5** Carrying Out a Test for a Population Mean
- UNC + — **7.6** Confidence Intervals for the Difference of Two Means
- UNC 4 — **7.7** Justifying a Claim About the Difference of Two Means Based on a Confidence Interval
- VAR 1 4 — **7.8** Setting Up a Test for the Difference of Two Population Means
- VAR DAT 3 4 — **7.9** Carrying Out a Test for the Difference of Two Population Means
- **7.10** Skills Focus: Selecting, Implementing, and Communicating Inference Procedures

Personal Progress Check 7

Multiple-choice: ~50 questions
Free-response: 2 questions
- Inference and Collecting Data
- Investigative Task

UNIT 8 Inference for Categorical Data: Chi-Square

~10–11 Class Periods | **2–5%** AP Exam Weighting

- VAR 1 — **8.1** Introducing Statistics: Are My Results Unexpected?
- VAR + — **8.2** Setting Up a Chi-Square Goodness of Fit Test
- VAR DAT 3 4 — **8.3** Carrying Out a Chi-Square Test for Goodness of Fit
- VAR 3 — **8.4** Expected Counts in Two-Way Tables
- VAR 1 4 — **8.5** Setting Up a Chi-Square Test for Homogeneity or Independence
- VAR DAT 3 4 — **8.6** Carrying Out a Chi-Square Test for Homogeneity or Independence
- **8.7** Skills Focus: Selecting an Appropriate Inference Procedure for Categorical Data

Personal Progress Check 8

Multiple-choice: ~30 questions
Free-response: 2 questions
- Inference
- Inference and Exploring Data/ Collecting Data

UNIT 9 Inference for Quantitative Data: Slopes

~7–8 Class Periods | 2–5% AP Exam Weighting

VAR 1	9.1	Introducing Statistics: Do Those Points Align?
UNC +	9.2	Confidence Intervals for the Slope of a Regression Model
UNC 4	9.3	Justifying a Claim About the Slope of a Regression Model Based on a Confidence Interval
VAR 1 4	9.4	Setting Up a Test for the Slope of a Regression Model
VAR DAT 3 4	9.5	Carrying Out a Test for the Slope of a Regression Model
	9.6	Skills Focus: Selecting an Appropriate Inference Procedure

Personal Progress Check 9

Multiple-choice: ~25 questions
Free-response: 1 question

- Inference and Exploring Data