



Grade Level: 10-12

Content: AP Statistics

Year: 2022-23

Course Description/Rationale

This course will introduce the major concepts and tools for collecting, analyzing, and making decisions from data. It includes four main topics. These are exploring data, sampling and experimentation, anticipating patterns, and statistical inference. **Required student supplies:**
Graphing Calculator Students will receive a weighted grade and have the opportunity to take the AP test in the spring. (2 HS credits)

Name of Unit	Time Frame	Essential Learning Target	Standard(s)
Exploring and Understanding Data	2 weeks	<ol style="list-style-type: none"> 1. Sample vs. Population 2. Quantitative vs. Categorical 3. The who, what, when, where, how, and why 4. Charts and tables (Bar, Pie Frequency Tables, Histograms, Dotplots, Stem-and-leaf, etc.) 5. Be able to find measures of center (mean and median) 6. Be able to find measures of spread (range, variance, standard deviation) 7. Be able to use z-scores and the 68-95-99.7 rule to describe normal models 	<p>A: Iowa Core: Mathematics (2010)</p> <p>IA: HS: Stats/Prob</p> <p>Interpreting Categorical & Quantitative Data</p> <p>S-ID Summarize, represent, and interpret data on a single count or measurement variable</p> <p>1. Represent data with plots on the real number line (dot plots, histograms, and box plots).(S-ID.1.)</p>

2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.(S-ID.2.)

3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).(S-ID.3.)

4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets and tables to estimate areas under the normal curve.(S-ID.4.)

<p>Exploring Relationships Between Variables</p>	<p>4 weeks</p>	<ol style="list-style-type: none"> 1. Be able to create and interpret scatterplots 2. Be able to find correlation between two variables 3. Be able to find the line of best fit between two variables 	<p>A: Iowa Core: Mathematics (2010)</p> <p>IA: HS: Stats/Prob</p> <p>Interpreting Categorical & Quantitative Data</p> <p>S-ID Summarize, represent, and interpret data on two categorical and quantitative variables</p> <p>5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal and conditional relative frequencies). Recognize possible associations and trends in the data.(S-ID.5.)</p> <p>6. Represent data on two quantitative variables on a scatter plot and describe how the variables are related.</p>
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			<p>6a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.(S-ID.6.)</p> <p>6b. Informally assess the fit of a model function by plotting and analyzing residuals.(S-ID.6 .)</p> <p>6c. Fit a linear function for scatter plots that suggest a linear association.(S-I D.6.)</p>
How to gather data	3-4 weeks	<ol style="list-style-type: none"> 1. Be able to create simulations 2. Know the different ways to collect data and any possible bias in collecting data 3. Know how to create an experiment 4. Know how to create an observational study 	<p>A: Iowa Core: Mathematics (2010)</p> <p>IA: HS: Stats/Prob</p> <p>Making Inferences & Justifying Conclusions</p> <p>S-IC Understand and evaluate</p>

random processes underlying statistical experiments

1. Understand that statistics is a process for making inferences about population parameters based on a random sample from that population.(S-IC. 1.)

2. Decide if a specified model is consistent with results from a given data-generating process, e.g. using simulation.(S-IC. 2.)

S-IC Make inferences and justify conclusions from sample surveys, experiments and observational studies

3. Recognize the purposes of and differences among sample surveys, experiments and observational studies; explain how randomization

			relates to each.(S-IC.3.)
Probability and Randomness	4-5 weeks	<ol style="list-style-type: none"> 1. Be able to find different probabilities using the various rules and properties (Addition Rule, Multiplication Rule, the Complement, etc.) 2. Be able to find the expected value of a situation 3. Be able to find probabilities of different probability models (Normal, Geometric, Binomial) 	<p>A: Iowa Core: Mathematics (2010)</p> <p>IA: HS: Stats/Prob</p> <p>Conditional Probability & the Rules of Probability</p> <p>S-CP Use the rules of probability to compute probabilities of compound events in a uniform probability model</p> <p>6. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A and interpret the answer in terms of the model. Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.(S-CP.6.)</p> <p>7. Apply the Addition Rule, $P(A \text{ or } B) = P(A)$</p>

+ $P(B) - P(A \text{ and } B)$, and

interpret the answer in terms of the model.(S-CP.7.)

8. (+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B|A) = P(B)P(A|B)$, and interpret the answer in terms of the model.(S-CP.8.)

Using Probability to Make Decisions

S-MD Calculate expected values and use them to solve problems

1. (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the

corresponding probability distribution using the same graphical displays as for data distributions.(S-MD.1.)

2. (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.(S-M D.2.)

3. (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated; find the expected value.(S-MD.3.)

4. (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.(S-MD.4.)

S-MD Use probability to evaluate outcomes of decisions

5. (+)Weigh the possible outcomes of a decision by

			<p>assigning probabilities to payoff values and finding expected values.</p> <p>5a. Find the expected payoff for a game of chance.(S-MD.5.)</p> <p>5b. Evaluate and compare strategies on the basis of expected values.(S-MD.5.)</p> <p>6. (+)Use probabilities to make fair decisions.(S-MD.6.)</p>
<p>Confidence Intervals and Hypothesis Tests for proportions</p>	<p>3 weeks</p>	<ol style="list-style-type: none"> 1. Be able to work with sampling distributions 2. Be able to find confidence intervals for proportions 3. Be able to test hypotheses about proportions 4. Be able to identify error in a hypothesis test 5. Be able to compare two proportions 	<p>Understand and evaluate random processes underlying statistical experiments (S-IC.A) 1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (S-IC.A.1) (DOK 1)</p>

<p>Inferences about means</p>	<p>3 weeks</p>	<ol style="list-style-type: none"> 1. Be able to find confidence intervals for means 2. Be able to test hypotheses about means 3. Be able to compare two means 	<p>Understand and evaluate random processes underlying statistical experiments (S-IC.A) 1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (S-IC.A.1) (DOK 1)</p>
<p>Inference when comparing variables</p>	<p>3-4 weeks</p>	<ol style="list-style-type: none"> 1. Be able to perform a goodness-of-fit test 2. Be able to determine homogeneity 3. Be able to perform the Chi-Square Test of Independence 4. Be able to perform a linear regression test and find and interval for slopes of a best fit line 	<p>A: Iowa Core: Mathematics (2010)</p> <p>IA: HS: Stats/Prob</p> <p>Interpreting Categorical & Quantitative Data</p> <p>S-ID Summarize, represent, and interpret data on two categorical and quantitative variables</p> <p>6b. Informally assess the fit of a model function by plotting and analyzing residuals.(S-ID.6 .)</p>

6c. Fit a linear function for scatter plots that suggest a linear association.(S-ID.6.)

S-ID Fit a linear function for scatter plots that suggest a linear relationship between variables

7. Interpret the slope (rate of change) and the intercept (constant term) of a linear fit in the context of the data.(S-ID.7.)

8. Compute (using technology) and interpret the correlation coefficient of a linear fit.(S-ID.8.)