STATISTICS & PROBABILITY

Quarter 1
- Unit 1 — Collecting Data and Drawing Conclusions
- Unit 2 — Summarizing Data

Quarter 2
- Unit 3 — Randomness in Data
- Unit 4 — Inference from Data: Principles

Quarter 3
- Unit 5 — Inference from Data: Conclusions
- Unit 6 — Inferences with Categorical Data

Quarter 4
- Unit 7 — Relationships in Data

Updated 8/10/15

The following are a list of essential standards for this course and a brief map of where they will be addressed.

Standard	Quarter 1	Quarter 2	Quarter 3	Quarter 4
S-ID.1: Represent data with plots on the real number line	X			
S-ID.2: Comparing center and spread of two+ data sets	X			
S-ID.3: Interpret differences in shape, center, and spread in data sets, investigate outliers	X			
S-ID.4: Use mean and standard deviation to fit it to normal distribution and estimate population percentages	X			
S-ID.5: Summarize categorical data in two-way frequency tables			X	
S-ID.6: Represent data on two quantitative variables on a scatterplot			X	X
S-ID.7: Interpret the slope and intercept of a linear model				X
S-ID.8: Compute and interpret the correlation coefficient of a linear fit				X
S-ID.9: Distinguish between correlation and causation				X
S-IC.1: Statistics as a process to make inferences based on samples	X			
S-IC.2: Decide if model is consistent with results		X		
S-IC.3: Recognize purpose and difference between surveys, experiments, and studies	X			
S-IC.4: Use sample survey data to estimate a population mean or proportion		X		

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Standard	Quarter 1	Quarter 2	Quarter 3	Quarter 4
S-IC.5: Use randomized experiment data to compare parameters		X	X	
S-IC.6: Evaluate reports based on data			X	
S-CP.1: Describe events as subsets of a sample space		X		
S-CP.4: Construct and interpret two-way frequency tables of data			X	
S-CP.7: Apply the Addition Rule P(A or B)= P(A) + P(B) − P(A and B)		X		
S-CP.8: Apply the general Multiplication Rule P(A and B)= P(A) P(B|A) = P(B) P(A|B)		X		

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Quarter 1 : Unit 1 Collecting Data and Drawing Conclusions (End Sept 25)	**Learning Goals:** **Introduction to key ideas and vocabulary of statistics** **Discover different types of data, how data is compared, and what conclusions can be drawn from data** **Explore experimental design**
Essential Questions	What can statistics help us do? What are the different types of variables? How can data be presented? What is the difference between random sampling and random assignment? What are the components of a well-designed experiment?
Content Objectives	**SWBAT** • **Identify the variables in a study and be able to classify them** • **Construct and interpret bar graphs and dotplots** • **Identify the population and sample, parameter, and statistic in a study** • **Identify sampling bias and potentially confounding variables in a study** • **Explain the importance of random sampling** • **Identify the features of a well-designed experiment**
Standards	S-ID.1, S-IC.1, & S-IC.3
Tier II Vocabulary	**Data; vary; predictions; research; solution; distributions; consistency; population; sample; representative; bias; random; quantitative; categorical; tendency; lurking; confounding; blindness; generalizing**
Tier III Vocabulary	**Statistics; binary; observational unit; parameter; placebo effect**
Assessments CIA: 10/26-10/30/15 Data Meeting: 11/9/15	**Summative Assessments:** **Formative Assessments:** **Common Prompts: Lab 1 Friend or Foe?** **Exercise 5-35 pg 95** **Rubrics:** **Grading:**
21st Century Learning Expectations	**Academic: Effective communication, evaluate information, solve problems, collaborate, support claims, use technology** **Social: Act with persistence when facing challenging tasks, responsible and respectful behavior, goal setting** **Civic: Utilize networking skills and engage inclusively with others**
RETELL Strategies	**7-step Vocab; posted word walls; Think Aloud; Partner Reading; Write Around**
Texts/Resources	Workshop Statistics, *Rossman and Chance*
Notes:	

Updated 8/10/15

Quarter 1 : Unit 2 Summarizing Data (End Oct 23)	**Learning Goals:** **Explore ways that data is presented, summarized, and compared** **Investigate measures of center and measures of spread**
Essential Questions	Why do people talk about means and medians? How can data be summarized? How reliable is the data?
Content Objectives	**SWBAT** • **Construct and interpret a two-way table** • **Describing the distribution of a quantitative variable** • **Identify advantages and disadvantages of several types of graphs** • **Calculate and interpret mean and median of a data set** • **Calculate and interpret interquartile ranges, standard deviations, and z-scores of a data set** • **Construct and interpret boxplots**
Standards	S-ID.2, S-ID.1, S-ID.3, & S-ID.4
Tier II Vocabulary	**Relative risk; independent; association; outliers; spread; center; shape; skew; median; mean; resistant; standardization**
Tier III Vocabulary	**Two-way table; segmented bar graph; conditional distributions; Simpson's paradox; standard deviation; z score**
Assessments CIA: 10/26-10/30/15 Data Meeting: 11/9/15	**Summative Assessments:** **Formative Assessments:** **Common Prompts: Lab 2 Is Yawning Contagious?** **Lab 3 Memorizing Letters** **Rubrics:** **Grading:**
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Quarter 2 : Unit 3 Randomness in Data (End Dec 4)	**Learning Goals:** **Explore the meaning of Probability** **Investigate Normal Distributions** **Perform calculations on sample proportions and sample means**
Essential Questions	What is the benefit of introducing randomness? How does identifying the outcomes as a normal distribution help analyze data? How do sample proportions vary from sample to sample? Why study a sample mean?
Content Objectives	**SWBAT** • **Explain the meaning of the probability of a random event** • **Use simulation analysis and sample space to produce probabilities** • **Perform calculations of probabilities and percentiles from a normal distribution** • **Describe the principle of sampling variability** • **Describe a sample proportion or a sample mean and identify when the Central Limit Theorem applies** • **Perform and interpret calculations related to statistical significance**
Standards	S-CP.1, S-CP.7, S-CP.8, S-IC.4, S-IC.5
Tier II Vocabulary	**Probability; distribution; frequency; simulation; expected; equally likely; percentiles; sampling**
Tier III Vocabulary	**Sample space; empirical estimate; normal distribution; statistical significance**
Assessments Midterms: 1/19-1/22/16 Data Meeting: 2/1/16	**Summative Assessments:** **Formative Assessments:** **Common Prompts: Lab 4 Rock-Paper-Scissors** **Rubrics:** **Grading:**
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Quarter 2 : Unit 4 Inference from Data: Principles (End Jan 14)	**Learning Goals:** **Calculate confidence intervals** **Conduct tests of significance** **Explore the relationships between intervals and tests**
Essential Questions	What value lies in calculating a confidence interval? Why conduct a test of significance? How sure does one need to be to draw a conclusion? How are intervals and tests related?
Content Objectives	**SWBAT** • **Calculate and interpret a confidence interval for a population proportion** • **Identify null and alternative hypotheses of a claim** • **Calculate and interpret test statistics** • **Describe what a significance test reveals about a confidence interval and vice versa** • **Estimate a population mean** • **Investigate the t-distribution and understand the difference between that and a normal distribution** • **Conduct all aspects of a t-test**
Standards	S-IC.4
Tier II Vocabulary	**Margin-of-error; duality; power**
Tier III Vocabulary	**Confidence interval; standard error; significance level; test decision**
Assessments Midterms: 1/19-1/22/16 Data Meeting: 2/1/16	**Summative Assessments:** **Formative Assessments:** **Common Prompts: Lab 5 Sleepless Nights** **Rubrics:** **Grading:**
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Quarter 3 : Unit 5 Inference from Data: Conclusions (End Mar 4)	**Learning Goals:** **Expand techniques to compare two populations or groups** **Explore matched-pair design**
Essential Questions	What is a significant difference? What is the difference between two samples drawn independently and the matched pairs design? What should be considered when making inferences?
Content Objectives	**SWBAT** • **Compare two groups and determine whether they differ significantly** • **Compare two sample means from results of independent random samples** • **Identify data as paired, independent, or randomized** • **Conduct and interpret paired t-test and paired t-interval**
Standards	S-IC.5, S-CP.4 & S-ID.5
Tier II Vocabulary	**Raw data; paired; magnitude; scope**
Tier III Vocabulary	**Conditional proportions; binary response variable; z-test; z-interval; t-test; t-interval**
Assessments CIA: 4/4-4/8/16 Data Meeting: 4/25/16	**Summative Assessments:** **Formative Assessments:** **Common Prompts: Lab 6 Comparison Shopping** **Rubrics:** **Grading:**
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Quarter 3 : Unit 6 Inferences with Categorical Data (End Apr 1)	**Learning Goals:** **Expand techniques to work with categorical data** **Explore chi-square tests to determine consistency between sample data and hypothesized models**
Essential Questions	How is the study of categorical variables different than quantitative? Why is it important to assess whether sample data conform to a hypothesized model? When should the chi-square tests be applied?
Content Objectives	**SWBAT** • **Identify questions that can be addressed with chi-square goodness-of-fit tests** • **Conduct and interpret chi-square goodness-of-fit tests** • **Identify scenarios that can be addressed with chi-square test for two-way tables** • **Conduct and interpret chi-square tests for two-way tables**
Standards	S-ID.6
Tier II Vocabulary	**Technical conditions; inference technique**
Tier III Vocabulary	**Chi-square distribution; expected count**
Assessments CIA: 4/4-4/8/16 Data Meeting: 4/25/16	**Summative Assessments:** **Formative Assessments:** **Common Prompts:** **Rubrics:** **Grading:**
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Texts/Resources	Workshop Statistics, *Rossman and Chance*
Notes:	

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Quarter 4 : Unit 7 Relationships in Data	**Learning Goals:** **Summarize data and study graphical methods for displaying results when both explanatory and response variables are quantitative** **Study correlation coefficient to describe the relationship between variables** **Use a least squares line to generalize findings**
Essential Questions	How is analyzing bivariate quantitative data different? When can interpreting graphs be a useful skill? When a scatterplot reveals a strong association, what could prevent a cause-and –effect conclusion?
Content Objectives	**SWBAT** • **Identify aspects of the variable relationship from a scatterplot** • **Apply properties of correlation coefficient as a measure of association between two variables** • **Use a least squares line to make predictions** • **Conduct significance tests and produce confidence intervals about a population slope coefficient**
Standards	S-ID.6, S-ID.7, S-ID.8
Tier II Vocabulary	**Association; direction; strength; form; slope; residual; regression line; influential; transformation; descriptively; inferentially**
Tier III Vocabulary	**Correlation coefficient; fitted value; least squares regression**
Assessments Finals: 6/7-6/10/16*	**Summative Assessments:** **Formative Assessments:** **Common Prompts: Lab 7 Backpack Weighing You Down?** **Rubrics:** **Grading:**
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RETELL Strategies	**7-step Vocab; posted word walls; Think Aloud; Partner Reading; Write Around**
Texts/Resources	Workshop Statistics, *Rossman and Chance*
Notes:	*Dates may be adjusted according to inclement weather cancellations

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