

## SAMPLE SYLLABUS #1

# AP<sup>®</sup> Statistics

## Curricular Requirements

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<b>CR1</b>	The students and teacher have access to a college-level statistics textbook, in print or electronic format.	<i>See page:</i> 2
<b>CR2</b>	The course provides opportunities for students to interpret standard computer output and use graphing calculators with statistical capabilities to describe data, determine probabilities, and perform tests.	<i>See page:</i> 4
<b>CR3</b>	The course is structured to incorporate the big ideas and required content outlined in each of the units described in the AP Course and Exam Description (CED).	<i>See pages:</i> 3, 4
<b>CR4</b>	The course provides opportunities for students to develop the course skills related to Skill Category 1: Selecting Statistical Methods.	<i>See page:</i> 5
<b>CR5</b>	The course provides opportunities for students to develop the course skills related to Skill Category 2: Data Analysis.	<i>See pages:</i> 3, 4, 5
<b>CR6</b>	The course provides opportunities for students to develop the course skills related to Skill Category 3: Using Probability and Simulation.	<i>See pages:</i> 6, 8
<b>CR7</b>	The course provides opportunities for students to develop the course skills related to Inference and Skill Category 4: Statistical Argumentation.	<i>See pages:</i> 8, 10

# Advanced Placement Statistics Sample Syllabus #1

## Textbook:

*Statistics: Learning from Data, AP Edition* Cengage Learning, 2014 by Roxy Peck and Chris Olsen **CR1**

## Student Practice:

Throughout each unit, **Topic Questions** will be provided to help students check their understanding. The Topic Questions are especially useful for confirming understanding of difficult or foundational topics before moving on to new content or skills that build upon prior topics. Topic Questions can be assigned before, during, or after a lesson, and as in-class work or homework. Students will get rationales for each Topic Question that will help them understand why an answer is correct or incorrect, and their results will reveal misunderstandings to help them target the content and skills needed for additional practice.

At the end of each unit, **Personal Progress Checks** will be provided in class or as homework assignments in AP Classroom. Students will get a personal report with feedback on every topic, skill, and question that they can use to chart their progress, and their results will come with rationales that explain every question's answer. One to two class periods are set aside to re-teach skills based on the results of the Personal Progress Checks.

## Additional Resources:

- SPLAT—freeware by Chris Olsen that all students have access to.
- All students have access to a TI-84 graphing calculator. Students use the calculator regularly throughout the year to construct plots, to calculate probabilities, to find the least squares regression line, to construct confidence intervals, and to perform tests of significance. The textbook presents computer output from Minitab that students are required to understand and interpret in order to answer the homework questions.
- Desmos software—freeware.
- StatCrunch software—used for demonstration.
- Fathom for teacher demonstrations.
- Released AP questions are used extensively throughout the course.
- Short clips from the *Against All Odds* video series are used to bring in real-world applications.
- TED talks are shown or assigned for viewing for homework; for example, Hans Rosling's "Best Statistics You Have Ever Seen" or Peter Donnelly's "How Juries Get Fooled by Statistics."
- Video clips from CBS News, 60 Minutes, ABC News, etc., that relate current events to statistics, such as the latest in stem cell research, the most recent studies on antidepressants, where we are in the fight to find a cure for Parkinson's disease, the power of placebos, etc.
- Websites such as gapminder.org or causeweb.org.
- Applets such as the Rossman/Chance applets, WISE applets, Duke University applets. Many of these applets lead students through a process to help them understand a concept. For example, the Dolphin applet by Alan Rossman and Beth Chance, along with their lab, help to introduce statistical inference.

### **CR1**

The syllabus must list the title, author, and publication date of a college-level introductory statistics textbook.

- *Activity-Based Statistics*, by Watkins, Schaeffer, et. al., provides many hands-on activities.
- AP Central activities such as the Coke/Pepsi taste test and the human confidence interval.

The course follows the nine units outlined in the Course and Exam Description (CED). Throughout each unit, the three big ideas are emphasized: Variation and Distribution (VAR); Patterns and Uncertainty (UNC); Data-Based Predictions, Decisions, and Conclusions (DAT).

## Unit 1: Exploring One-Variable Data (Big Ideas: VAR, UNC) **CR3**

Chapter 2: Graphical Methods for Describing Data Distributions

Chapter 3: Numerical Methods for Describing Data Distributions

Chapter 6: Random Variables and Probability Distributions

CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
1.1: Introducing Statistics: What Can We Learn from Data?	1.A	2.1
1.2: The Language of Variation: Variables	2.A	2.1
1.3: Representing a Categorical Variable with Tables	2.A, 2.B	2.2
1.4: Representing a Categorical Variable with Graphs	2.A, 2.B, 2.D	2.2, 2.4
1.5: Representing a Quantitative Variable with Graphs	2.A, 2.B	2.1, 2.3
1.6: Describing the Distribution of a Quantitative Variable	2.A	2.3, 3.1, 3.2, 3.3
1.7: Summary Statistics for a Quantitative Variable	2.C, 4.B	2.5, 3.1, 3.2, 3.3, 3.4, 3.5
1.8: Graphical Representations of Summary Statistics	2.A, 2.B	3.3, 3.4, 3.5
1.9: Comparing Distributions of a Quantitative Variable	2.D	2.3, 3.3
1.10: The Normal Distribution	2.D, 3.A	3.6, 6.5, 6.6

### Personal Progress Check:

Complete Personal Progress Check MCQ Part A for Unit 1.

Complete Personal Progress Check MCQ Part B for Unit 1.

Complete Personal Progress Check FRQ for Unit 1.

Take Unit 1 Test.

**Activity:** Students are given a set of histograms and a set of summary statistics. Students must match the appropriate summary statistics to the histograms. This provides practice for skill 2.D and BIs VAR and UNC. **CR5**

### **CR3**

The syllabus must include an outline of course content by unit title or topic using any organizational approach with the associated big idea(s) to demonstrate the inclusion of required course content. All three big ideas must be included: Variation and Distribution (VAR), Patterns and Uncertainty (UNC), and Data-Based Predictions, Decisions, and Conclusions (DAT).

### **CR5**

The syllabus must include a brief description of one or more classroom activities, projects, or problem sets in which students do one or more of the following skills:

- describe data presented numerically (Skill 2.A)
- construct numerical or graphical representations of distributions (Skill 2.B)
- calculate summary statistics, relative positions of points within a distribution, correlation, and predicted response (Skill 2.C)
- compare distributions or relative positions of points within a distribution (Skill 2.D)

The activities, projects, or problem sets must be labeled so that the corresponding skill(s) and big idea(s) are evident.

**Activity:** Students collect data from their class, such as how many states and provinces they have visited. They are asked to calculate the five-number summary and construct a boxplot. They are then asked to construct a histogram and a stem-and-leaf plot. Students discuss with a partner the benefits of each type of graphical display. This activity addresses skills 2.A, 2.B, 2.C, and 2.D and BIs VAR and UNC. **CR5**

## Unit 2: Exploring Two-Variable Data (Big Ideas: VAR, UNC, DAT) **CR3**

Chapter 2: Graphical Methods for Describing Data Distributions

Chapter 4: Describing Bivariate Numerical Data

Chapter 15: Learning from Categorical Data

Chapter 16: Understanding Relationships—Numerical Data Part 2

CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
2.1: Introducing Statistics: Are Variables Related?	1.A	2.4
2.2: Representing Two Categorical Variables	2.D	2.4
2.3: Statistics for Two Categorical Variables	2.C, 2.D	15.2
2.4: Representing the Relationship Between Two Quantitative Variables	2.A, 2.B	4.1, 4.2, 4.3, 4.4
2.5: Correlation	2.C, 4.B	4.1, 4.3, 4.4
2.6: Linear Regression Models	2.C	4.2
2.7: Residuals	2.A, 2.B	4.3, 4.4
2.8: Least Squares Regression	2.C, 4.B	4.2, 4.3, 4.4, 16.1
2.9: Analyzing Departures from Linearity	2.A, 2.C	4.3, 4.4, 4.5, 4.6, 16.1

### Personal Progress Check:

Complete Personal Progress Check MCQ Part A for Unit 2.

Complete Personal Progress Check MCQ Part B for Unit 2.

Complete Personal Progress Check FRQ for Unit 2.

Take Unit 2 Test.

**Activity:** Students will collect measurements of their height, arm span, kneeling height, and hand span in order to test Leonardo da Vinci's theory of human proportions. They will use graphing calculators to calculate the expected slope under da Vinci's hypotheses and compare it to the slope of the LSRL found by using StatCrunch. This provides an introduction to residual plots, correlation, and the coefficient of determination. **CR2**

**Activity:** Students collect data to explore Kepler's third law. They transform the data to achieve linearity and compare their transformation to Kepler's prediction. This is all done using StatCrunch or SPLAT. **CR2**

### **CR2**

The syllabus must include a description of one or more classroom activities, projects, or problem sets in which students interpret standard computer output to describe data, determine probabilities, or perform tests.

AND

The syllabus must include a description of one or more classroom activities, projects, or problem sets in which students use graphing calculators to describe data, determine probabilities, or perform tests.

## Unit 3: Collecting Data (Big Ideas: VAR, DAT)

### Chapter 1: Collecting Data in Reasonable Ways

**Activity:** Students work in class on the NCSSM 2007 Rolling Down the River activity that requires them to conduct a convenience sample, an SRS, and two stratified samples using different strata. Students then need to determine the most appropriate sampling technique to use and describe why it is superior to the other methods, addressing skill 1.C and BIs VAR and DAT. **CR4**

CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
3.1: Introducing Statistics: Do the Data We Collected Tell the Truth?	1.A	1.1
3.2: Introduction to Planning a Study	1.C, 4.A	1.1, 1.2, 1.3, 1.4, 1.5
3.3: Random Sampling and Data Collection	1.C	1.2
3.4: Potential Problems with Sampling	1.C	1.2
3.5: Introduction to Experimental Design	1.B, 1.C	1.3
3.6: Selecting an Experimental Design	1.C	1.3
3.7: Inference and Experiments	4.B	1.4, 1.5

### CR4

The syllabus must include a brief description of one or more classroom activities, projects, or problem sets in which students describe an appropriate method for gathering and representing data (Skill 1.C). The activities, projects, or problem sets must be labeled so that the corresponding skill and big idea(s) are evident.

## Personal Progress Check:

Complete Personal Progress Check MCQ Part A for Unit 3.

Complete Personal Progress Check MCQ Part B for Unit 3.

Complete Personal Progress Check FRQ for Unit 3.

Take Unit 3 Test.

**Activity:** Students collect data on their pulse rates for the treatment “standing” and the comparison group “sitting.” Students are part of a completely randomized design and a matched pairs design. Students then make appropriate graphs and calculate statistics to compare pulse rates between standing and sitting. Students must discuss the best design for this situation given financial and time constraints. They will draw a conclusion based on the experimental results. This activity addresses Skills 1.C, 2.A, 2.B, 2.C, 2.D and BIs VAR and DAT. **CR4 CR5**

## Unit 4: Probability, Random Variables, and Probability Distributions (Big Ideas: VAR, UNC)

### Chapter 2: Graphical Methods for Describing Data Distributions

### Chapter 5: Probability

### Chapter 6: Random Variables and Probability Distributions

CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
4.1: Introducing Statistics: Random and Non-Random Patterns?	1.A	5.1
4.2: Estimating Probabilities Using Simulation	3.A	5.1, 5.2, 5.7
4.3: Introduction to Probability	3.A, 4.B	5.1, 5.2
4.4: Mutually Exclusive Events	4.B	5.3

CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
4.5: Conditional Probability	3.A	5.3, 5.4
4.6: Independent Events and Unions of Events	3.A	5.3, 5.5, 5.6
4.7: Introduction to Random Variables and Probability Distributions	2.B, 4.B	2.3, 6.1, 6.2, 6.3
4.8: Mean and Standard Deviation of Random Variables	3.B, 4.B	6.2, 6.4
4.9: Combining Random Variables	3.B, 3.C	6.2, 6.4
4.10: Introduction to the Binomial Distribution	3.A	6.5
4.11: Parameters for a Binomial Distribution	3.B, 4.B	6.5
4.12: The Geometric Distribution	3.A, 3.B, 4.B	6.5

## Personal Progress Check:

Complete Personal Progress Check MCQ Part A for Unit 4.

Complete Personal Progress Check MCQ Part B for Unit 4.

Complete Personal Progress Check MCQ Part C for Unit 4.

Complete Personal Progress Check FRQ for Unit 4.

Take Unit 4 Test.

**Activity:** Students use rolls of a four-sided die to explore the probability distributions for the discrete random variables  $X+X$  versus  $2X$ . They compare the shape of the distributions, the center, and the variability in order to examine the differences between linear combinations and linear transformations of discrete random variables. This activity addresses Skill 3.C and BI UNC. **CR6**

**Activity:** Students work through exercises using data from the *Titanic* to explore probabilities, including independence and conditional probabilities. This activity addresses Skill 3.A and BI UNC. **CR6**

## Unit 5: Sampling Distributions (Big Ideas: VAR, UNC)

Chapter 6: Random Variables and Probability Distributions

Chapter 8: Sampling Variability and Sampling Distributions

Chapter 9: Estimating a Population Proportion

Chapter 11: Asking and Answering Questions About the Difference Between Two Population Proportions

Chapter 12: Asking and Answering Questions About a Population Mean

Chapter 13: Asking and Answering Questions About the Difference Between Two Population Means

Chapter 14: Learning from Experimental Data

### CR6

The syllabus must include a brief description of one or more classroom activities, projects, or problem sets in which students do one or more of the following:

- Determine relative frequencies, proportions, or probabilities using simulation or calculation (Skill 3.A)
- Determine parameters for probability distributions (Skill 3.B)
- Describe probability distributions (Skill 3.C)

The activities, projects, or problem sets must be labeled so that the corresponding skill(s) and big idea(s) are evident.

CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
5.1: Introducing Statistics: Why Is My Sample Not Like Yours?	1.A	8.1
5.2: The Normal Distribution, Revisited	3.A, 3.C	6.3, 6.7, 6.8
5.3: The Central Limit Theorem	3.C	8.1, 8.2, 8.3, 12.1, 14.4
5.4: Biased and Unbiased Point Estimates	3.B, 4.B	9.1
5.5: Sampling Distributions for Sample Proportions	3.B, 3.C, 4.B	9.1, 9.2
5.6: Sampling Distributions for Differences in Sample Proportions	3.B, 3.C, 4.B	11.2
5.7: Sampling Distributions for Sample Means	3.B, 3.C, 4.B	12.1
5.8: Sampling Distributions for Differences in Sample Means	3.B, 3.C, 4.B	13.1, 13.2

## Personal Progress Check:

Complete Personal Progress Check MCQ Part A for Unit 5.

Complete Personal Progress Check MCQ Part B for Unit 5.

Complete Personal Progress Check MCQ Part C for Unit 5.

Complete Personal Progress Check FRQ for Unit 5.

Take Unit 5 Test.

## Unit 6: Inference for Categorical Data: Proportions (Big Ideas: VAR, UNC, DAT)

Chapter 9: Estimating a Population Proportion

Chapter 10: Asking and Answering Questions About a Population Proportion

Chapter 11: Asking and Answering Questions About a Difference Between Two Population Proportions

CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
6.1: Introducing Statistics: Why Be Normal?	1.A	9.3
6.2: Constructing a Confidence Interval for a Population Proportion	1.D, 3.D, 4.C	9.2
6.3: Justifying a Claim Based on a Confidence Interval for a Population Proportion	4.A, 4.B, 4.D	9.2
6.4: Setting Up a Test for a Population Proportion	1.E, 1.F, 4.C	9.4, 9.5, 10.1
6.5: Interpreting $p$ -Values	3.E, 4.B	9.4, 9.5
6.6: Concluding a Test for a Population Proportion	4.E	10.1, 10.3, 10.4, 10.5
6.7: Potential Errors When Performing Tests	1.B, 3.A, 4.A, 4.B	10.2, 10.6, 10.7

CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
6.8: Confidence Intervals for the Difference of Two Proportions	1.D, 3.D, 4.C	11.2
6.9: Justifying a Claim Based on a Confidence Interval for a Difference of Population Proportions	4.B, 4.D	9.3, 11.2
6.10: Setting Up a Test for the Difference of Two Population Proportions	1.E, 1.F, 4.C	11.3
6.11: Carrying Out a Test for the Difference of Two Population Proportions	3.E, 4.B, 4.E	11.3

## Personal Progress Check:

Complete Personal Progress Check MCQ Part A for Unit 6.

Complete Personal Progress Check MCQ Part B for Unit 6.

Complete Personal Progress Check MCQ Part C for Unit 6.

Complete Personal Progress Check MCQ Part D for Unit 6.

Complete Personal Progress Check FRQ for Unit 6.

Take Unit 6 Test.

**Activity:** The class conducts the Coke/Pepsi taste test activity from AP Central to introduce significance tests. Students use dice to simulate the distribution of the number of correct identifications based on random guessing. This simulation is then used to estimate the probability of obtaining the class result if the guesses were purely random. This activity addresses Skill 3.A and BI UNC. **CR6**

**Activity:** The class is asked which candy has a higher proportion of yellow candy: Skittles or M&Ms. The class agrees on an appropriate inference method and identifies the alternative hypothesis (Skills 1.E and 1.F). They check that they have met the conditions for inference for the identified significance test (Skill 4.C). The class counts the candies to find the proportion of yellow candies in each sample. They calculate the test statistic and  $p$ -value (Skill 3.E) and then draw an appropriate conclusion (Skills 4.A, 4.B, and 4.E). This activity touches upon all three big ideas. **CR7**

## Unit 7: Inference for Quantitative Data: Means (Big Ideas: VAR, UNC, DAT)

Chapter 9: Estimating a Population Proportion

Chapter 10: Asking and Answering Questions About a Population Proportion

Chapter 12: Asking and Answering Questions About a Population Mean

Chapter 13: Asking and Answering Questions About the Difference Between Two Population Means

Chapter 14: Learning from Experimental Data

CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
7.1: Introducing Statistics: Why Should I Worry About Error?	1.A	10.2
7.2: Constructing a Confidence Interval for a Population Mean	1.D, 3.C, 3.D, 4.C	12.1, 12.2, 12.4, 13.4, 14.1, 14.2, 14.3
7.3: Justifying a Claim About a Population Mean Based on a Confidence Interval	4.A, 4.B, 4.D	9.3, 12.2

### CR7

The syllabus must include a brief description of one or more classroom activities, projects, or problem sets in which students perform and interpret statistical inference to justify conclusions using one of the following procedures and all corresponding skills:

- confidence intervals (Skills 1.D, 3.D, 4.A, 4.B, 4.C, and 4.D)
- significance tests (Skills 1.E, 1.F, 3.E, 4.A, 4.B, 4.C, and 4.E)

The activities, projects, or problem sets must be labeled so that the corresponding skills and big idea(s) are evident.



CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
7.4: Setting Up a Test for a Population Mean	1.E, 1.F, 4.C	12.1, 12.3, 12.4, 14.1, 14.2, 14.3
7.5: Carrying Out a Test for a Population Mean	3.E, 4.B, 4.E	12.3, 12.4
7.6: Confidence Intervals for the Difference of Two Means	1.D, 3.D, 4.C	13.3, 14.1, 14.2, 14.3
7.7: Justifying a Claim About the Difference of Two Means Based on a Confidence Interval	4.A, 4.B, 4.D	13.3, 14.1, 14.2, 14.3
7.8: Setting Up a Test for the Difference of Two Population Means	1.E, 1.F, 4.C	13.1, 13.2, 14.1, 14.2, 14.3
7.9: Carrying Out a Test for the Difference of Two Population Means	3.E, 4.B, 4.E	13.1, 13.2, 14.1, 14.2, 14.3
7.10: Skills Focus: Selecting, Implementing, and Communicating Inference Procedures	N/A	N/A

## Personal Progress Check:

Complete Personal Progress Check MCQ Part A for Unit 7.

Complete Personal Progress Check MCQ Part B for Unit 7.

Complete Personal Progress Check MCQ Part C for Unit 7.

Complete Personal Progress Check FRQ for Unit 7.

Take Unit 7 Test.

## Unit 8: Inference for Categorical Data: Chi-Square (Big Ideas: VAR, DAT)

Chapter 15: Learning from Categorical Data

CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
8.1: Introducing Statistics: Are My Results Unexpected?	1.A	15.1
8.2: Setting Up a Chi-Square Goodness of Fit Test	1.E, 1.F, 3.A, 3.C, 4.C	15.1
8.3: Carrying Out a Chi-Square Test for Goodness of Fit	3.E, 4.B, 4.E	15.1
8.4: Expected Counts in Two-Way Tables	3.A	15.2, 15.3
8.5: Setting Up a Chi-Square Test for Homogeneity or Independence	1.E, 1.F, 4.C	15.2, 15.3
8.6: Carrying Out a Chi-Square Test for Homogeneity or Independence	3.E, 4.B, 4.E	15.2, 15.3
8.7: Skills Focus: Selecting an Appropriate Inference Procedure for Categorical Data	N/A	15.1, 15.2, 15.3

## Personal Progress Check:

Complete Personal Progress Check MCQ Part A for Unit 8.

Complete Personal Progress Check MCQ Part B for Unit 8.

Complete Personal Progress Check FRQ for Unit 8.

Take Unit 8 Test.

## Unit 9: Inference for Quantitative Data: Slopes (Big Ideas: VAR, UNC, DAT)

Chapter 16: Understanding Relationships: Numerical Data Part 2

CED TOPICS	CED SKILLS	SECTION FROM TEXTBOOK
9.1: Introducing Statistics: Do Those Points Align?	1.A	16.1
9.2: Confidence Intervals for the Slope of a Regression Model	1.D, 3.D, 4.C	16.2, 16.3
9.3: Justifying a Claim About the Slope of a Regression Model Based on a Confidence Interval	4.A, 4.B, 4.D	16.2, 16.3
9.4: Setting Up a Test for the Slope of a Regression Model	1.E, 1.F, 4.C	16.2, 16.3
9.5: Carrying Out a Test for the Slope of a Regression Model	3.E, 4.B, 4.E	16.2, 16.3
9.6: Skills Focus: Selecting an Appropriate Inference Procedure	N/A	16.2, 16.3

## Personal Progress Check:

Complete Personal Progress Check MCQ Part A for Unit 9.

Complete Personal Progress Check MCQ Part B for Unit 9.

Complete Personal Progress Check FRQ for Unit 9.

Take Unit 9 Test.

**Project:** Students will complete a project in which they are required to design an experiment or sample survey, collect data, and analyze their results using an appropriate method of inference (Skills 1.A, 1.B, 1.C, and 1.E). The project emphasizes that the big idea of variation and distribution has been the underlying theme throughout all nine units. Students develop hypotheses (Skills 1.F and 4.A) and then collect their own data and examine it graphically, exploring measures of center, shape, and variation (Skills 2.A, 2.B, and 2.C). They justify the approximate shape of the sampling distribution for the statistic and check conditions for inference (Skill 4.C) and then obtain the test statistic and  $p$ -value (Skill 3.E). They justify their claim based on the test statistic in the context of the study (Skills 4.B and 4.E). All three big ideas are reviewed in this project. **CR7**

## Guidelines for Statistics Projects

The process of developing a statistical project should demonstrate the scientific method of solving a problem:

1. Pose a focused question or questions
2. Collect appropriate data
3. Analyze the data intelligently
4. Draw correct conclusions

In proposing a question to be answered, you should consider what you find interesting. What are your hobbies or passions in life? You will be spending much time on this project, so think about a question that you are interested in discovering the answer to. Make sure that it is a question that can be answered and not one that is completely open-ended. You must collect your own data. You cannot use data from another source, such as the internet, that you can look up. You must implement a sample survey or conduct an experiment.

Before you begin collecting data, you must consider how you will analyze the data. Will your analysis answer your question? Test this by making up some data in response to your survey or experiment. Try to analyze it. Do you meet the conditions of the procedure? Do your results provide an answer to your question? If so, you may begin collecting your data. A self-critique is required in your written report. Consider the strengths and weaknesses of the project. What went right? What went wrong? What would you change if you were to do it again?

## The Written Report

You should plan how you will communicate your work effectively. The longest report does not necessarily represent the best project. However, the report **MUST** do the following:

1. Demonstrate how and why the particular topic was chosen
2. Show how the research was conducted
3. Delineate what conclusions were obtained
4. Include the collected data and analysis of the data
5. Discuss the strengths and weaknesses of the selected statistical methods

## The Oral Presentation

In addition to all the elements of the written report, you should consider what visual aids you will incorporate into your oral presentation.