

Instructor:

Syllabus and Pacing Guide
Advanced Placement Statistics
Saugus High School
Saugus, MA 01906
2009-2010

In the twenty-first century, computers will do a lot of the work that people used to do. Even in today's workplace, there is little need for someone to add up daily invoices or compute sales tax. Engineers and scientists already use computer programs to do calculations and solve equations.

Some important skills for the twenty-first century will be the ability to think creatively about mathematics and to reason logically. It will also be important to work as a team member and to be able to explain your thinking. In keeping up with our schools mission statement, I will do my best to prepare you for college and with your cooperation and your parents help to prepare you to be a valuable citizen for the rest of your life.

This course will help you to develop many of the skills you will need for the future. On the way, you will see the value of creative thinking, but the key question will always be: **"What do YOU think?"**

Prerequisites: 88 average in Honors Algebra II and teacher recommendation. This is a rigorous course based on on the syllabus defined by the Advanced Placement Committee. Major themes encompass exploring data; patterns and departure from patterns; anticipating patterns; producing models using probability and simulation; planning a study; deciding what and how to measure; and statistical inference; confirming models. Graphing calculators required to be obtained by the student, and access to a computer is needed, school will provide access in school only.

Calculator: In this class calculator use is essential as we use TI-Navigator almost daily.

You should have basic knowledge of using TI-84 or TI-83 + . You should understand how to input data into lists and graph any of the stat plots requested.

Course Goals: The goals of this course follow the standards outlined for Advanced Placement Statistics. They are numbered and will be inserted into the pacing guide to indicate when various lessons target an individual goal.

Computer: We use the computer in conjunction with the TI-Navigator as well as with a program called MINITAB.

G1: Exploring Data: Observing patterns and departure from patterns
G2: Planning a study: Deciding what and how to measure
G3: Anticipating Patterns: Producing models using probability theory and simulation
G4: Statistical Inference: Confirming Data

TEXT: Introduction to the practice of STATISTICS (SECOND EDITION)

Course materials: Calculator (TI 83 plus or TI 84), pencil, notebook, straight edge.

GRADING: HOMEWORK-----10%
CLASS-PARTICIPATION---10%
QUIZZES-----30%
TESTS-----50%

MID-TERM GRADE: is the average of quarter grades and mid-term exam grade.

FINAL GRADE is the average of all the quarter grades, mid-term exam grade and final exam grade.

NOTA-BENE: Mid-term and final exams are going to be cumulative.

PROJECT: ONE OR MORE PER TERM WORTH ONE TEST GRADE

Project 1: Are estimates influenced by “anchoring” numbers?

You will be graded on:

How well you design the experiment, displaying your data in an appropriate graph and then describing and analyzing it using the vocabulary of the chapter 2, center, variation, distribution, outliers and how the data is affected by changing characteristics of the data over time.

Project 2. Capture recapture.

Using a large bag of M@M (not counted), you will try to estimate the number of M@M by experimenting with the method of capture recapture. Justify the report by making reference to probability and counting techniques as taught in this chapter.

Project 3. Construct confidence interval, collecting data by choosing a simple random sample to estimate the population mean.

Justify each step of the experiment with appropriate statistical terminology.

Project 4. This project will be done by a group of 3-4 students.

Each group will design an experiment and perform an appropriate statistical test to answer the following questions.

You will ask these two questions.

a) Which political party do you favor most?

b) If you were to make up an absence excuse of a flat tire, which tire would you name?

Answer the following questions.

1) Political party choice is independent of the gender of the subject.

2) The tire identified as being flat is independent of the gender of the subject.

3) Political party choice is independent of the tire identified as being flat.

Three final projects: Using the student body of the High School will design three experiments:

1) Test the validity that the mean grade in the high school is 68.5

2) The difference in the height of boys and girls is more than 3 inches.

3) Test the validity that the mean grade in the high school for mathematics 59.9.

All three projects are to be done in accordance with the rules of statistics learned in this class, and to be presented typed and in the format provided below.

Test of Significance Template

1) Parameter of Interest

2) Choice of Test

3) Check of Assumptions

Statement of Assumptions:

Verifications of Assumptions

4) Null Hypothesis: Ho: (in words) _____

Ho: (in symbols) _____

5) Alternative Hypothesis: Ha: (in words) _____

<p>Week 1</p>	<p>Chapter 1 Looking at Data: Distributions</p> <p>1.1 Displaying Distributions Measurements Variation Stemplots Histograms Looking At Data Time Plots</p> <p>1.2 Describing Distributions Measuring Center Resistant Measures of Spread The Standard Deviation Changing the Unit of Measurements</p>	<p>Text Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course.</p>	<p>G1</p> <p><i>Exploratory analysis of data makes use of graphical and numerical techniques to study patterns and departures from patterns. Emphasis should be placed on interpreting information from graphical and numerical displays and summaries.</i></p>
<p>Week 2</p>	<p>1.3 The Normal Distributions Density Curves Normal Distributions Normal Distributions Calculations Assessing Normality</p>	<p>Text Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course.</p>	<p>G1</p> <p><i>Exploratory analysis of data makes use of graphical and numerical techniques to study patterns and departures from patterns. Emphasis should be placed on interpreting information from graphical and numerical displays and summaries.</i></p>
<p>Week 3</p>	<p>Chapter 2 Looking at Data: Relationships</p> <p>2.1 Scatterplots Interpreting Scatterplots</p>	<p>Introduction to the practice of statistics</p>	<p>G1</p> <p><i>Data must be collected according to a well-developed plan if valid</i></p>

<p>Week 4</p>	<p>Smoothing Scatterplots Categorical Explanatory Variables</p> <p>2.2 Least Squares Regression Fitting a Line to Data Least-Squares Regression Residuals Outliers and Influential Observations</p> <p>2.3 An Application: Exponential Growth The Nature of Exponential Growth The Logarithm Transformation Residuals Again</p>	<p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course.</p>	<p><i>information on a conjecture is to be obtained. This plan includes clarifying the question and deciding upon a method of data collection and analysis.</i></p>
<p>Week 5</p>	<p>2.4 Correlation Computing the Correlation Correlation in the Regression Setting Interpreting Correlation and Regression</p> <p>2.5 Relations in Categorical</p>	<p>Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course.</p>	<p>G2</p> <p><i>Data must be collected according to a well-developed plan if valid information on a conjecture is to be obtained. This plan includes clarifying the question and deciding upon a method of data collection and analysis</i></p>

Week 6	Data Analyzing Two-Way Tables Simpson's Paradox		
Week 7	2.6 The Questions of Causation Smoking and Lung Cancer Establishing Causation		
Week 8	Chapter 3 Producing Data 3.1 First Steps The Need for Design Sampling Experiments	Introduction to the practice of statistics David S. Moore George P. McCabe	G2 <i>Data must be collected according to a well-developed plan if valid information on a conjecture is to be obtained. This plan includes clarifying the question and deciding upon a method of data collection and analysis</i>
Week 9	3.2 Design of Experiments Comparative Experiments Randomization How to Randomize Cautions about Experimentation Other Experimental Design	Calculator, TI – interactive is used throughout the course. Introduction to the practice of statistics	G2 <i>Data must be collected according to a well-developed plan if valid information on a conjecture is to be obtained. This plan includes clarifying the question and deciding upon a method of data collection and analysis</i>
Week 10	3.3 Sampling Design Simple Random Samples Other Sampling Designs Cautions about Sample Surveys	David S. Moore George P. McCabe	
Week 10	3.4 Toward Statistical Inference Sampling Distributions Bias Variability What about Experiments? Conclusion	Calculator, TI – interactive is used throughout the course.	
Week	Chapter 4		

11	<p>Probability: The Study of Randomness</p> <p>The Idea of Probability The uses of Probability</p>	<p>Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p>	<p>G3</p>
Week 12	<p>4.1 Probability Models</p> <p>Sample Spaces Assigning Probabilities Addition and Multiplication Rules</p> <p>4.2 Random Variables</p> <p>Discrete Random Variables Continuous Random Variables</p>	<p>Calculator, TI – interactive is used throughout the course.</p>	<p><i>Probability is the tool used for anticipating what the distribution of data should look like under a given model.</i></p>
Week 13	<p>4.3 Means and Variances of Random Variables</p> <p>The Mean of a Random Variable The Law of Large Numbers Rules for Means The Variance of a Random Variable Rules for Variances</p>	<p>Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course.</p>	<p>G3</p> <p><i>Probability is the tool used for anticipating what the distribution of data should look like under a given model.</i></p>
Week 14	<p>4.4 Probability Laws</p> <p>General Addition Rules Conditional Probabilities and General Multiplication Rules</p>		
Week 15	<p>Chapter 5</p> <p>From Probability to Inference</p> <p>5.1 Counts and Proportions</p> <p>The Binomial Distributions</p>	<p>Introduction to the practice of statistics</p>	<p>G4</p> <p><i>Statistical inference guides the selection of appropriate models.</i></p>

<p>Week 16</p>	<p>Binomial Probabilities Binomial Mean and Variance Sample Proportions Normal Approximation for Proportion and Counts</p> <p>5.2 Sample Means The Distributions of a Sample Mean The Central Limit Theorem</p> <p>5.3 Control Charts \bar{x} Control Charts Out-of-Control Signals</p>	<p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course.</p>	<p>Models and data interact in statistical work: models are used to draw conclusions from data, while the data are allowed to criticize and even falsify the model through inferential and diagnostic methods. Inference from data can be thought of as the process of selecting a reasonable model, including a statement in probability language, of how confident one can be about the selection.</p>
<p>Week 17</p>	<p>Chapter 6 Introduction to Inference</p> <p>6.1 Estimating with Confidence Statistical Confidence Confidence Intervals How Confidence Intervals Behave</p>	<p>Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course.</p>	<p>G4</p> <p><i>Statistical inference guides the selection of appropriate models.</i> Models and data interact in statistical work: models are used to draw conclusions from data, while the data are allowed to criticize and even falsify the model through inferential and diagnostic methods. Inference from data can be thought of as the process of selecting a reasonable model, including a statement in probability language, of how confident one can be about the selection.</p>
<p>Week 18</p>	<p>6.2 Test of Significance The Nature of Significance Testing Tests for a Population Mean Tests with Fixed Significance Level</p> <p>6.3 Use and Abuse of Tests Using Significance Tests</p>		

Week 19	Abuse of Significance Tests Power Inference As Decision		
Week 20	<p>Chapter 7 Inference for Distributions</p> <p>7.1 Inference for the Mean of a Population The One Sample t Procedures Matched Pairs t Procedures The Power of the t Test Inference for Nonnormal Populations</p>	<p>Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course.</p>	<p>G4</p> <p><i>Statistical inference guides the selection of appropriate models. Models and data interact in statistical work: models are used to draw conclusions from data, while the data are allowed to criticize and even falsify the model through inferential and diagnostic methods. Inference from data can be thought of as the process of selecting a reasonable model, including a statement in probability language, of how confident one can be about the selection.</i></p>
Week 21	<p>7.2 Comparing Two Means The Two-Sample z Statistic The Two-Sample t Procedures The Pooled Two-Sample t Procedures</p>		<p>G4</p> <p><i>Statistical inference guides the selection of appropriate models. Models and data interact in statistical work: models are used to draw conclusions from data, while the data are allowed to criticize and even falsify the model through inferential and diagnostic methods. Inference from data can be thought of as the process of selecting a reasonable model, including a statement in probability language, of how confident one can be about the selection.</i></p>
Week 22	<p>7.3 Inference for Population Spread The F Test Robustness of Normal Inference Procedures</p>	<p>Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course</p>	<p>G4</p> <p><i>Statistical inference guides the selection of appropriate models. Models and data interact in statistical work: models are used to draw conclusions from data, while the data are allowed to criticize and even falsify the model through inferential and diagnostic methods. Inference from data can be thought of as the process of selecting a reasonable model, including a statement in probability language, of how confident one can be about the selection.</i></p>
Week 23	Chapter 8 Inference for Count Data		G4

<p>Week 24</p>	<p>8.1 Inference for a Single Proportion Confidence Intervals and Significance Tests Choosing A Sample Size</p> <p>8.2 Comparing Two Proportions Confidence Intervals Significance Tests</p>	<p>Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course.</p>	<p><i>Statistical inference guides the selection of appropriate models.</i> Models and data interact in statistical work: models are used to draw conclusions from data, while the data are allowed to criticize and even falsify the model through inferential and diagnostic methods. Inference from data can be thought of as the process of selecting a reasonable model, including a statement in probability language, of how confident one can be about the selection.</p>
<p>Week 26</p>	<p>8.3 Inference for Two-Way Tables Describing Relations in Two-Way Tables The Chi-Squared Test Computations Models for Two-Way Tables</p>	<p>Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course.</p>	<p>G4</p> <p><i>Statistical inference guides the selection of appropriate models.</i> Models and data interact in statistical work: models are used to draw conclusions from data, while the data are allowed to criticize and even falsify the model through inferential and diagnostic methods. Inference from data can be thought of as the process of selecting a reasonable model, including a statement in probability language, of how confident one can be about the selection.</p>
<p>Week</p>	<p>Chapter 9</p>		

27	<p>Inference for Regressions</p> <p>9.1 Simple Linear Regressions Statistical Model For Linear Regression Estimating the Regression Parameters Confidence Intervals and Significance Tests Confidence Intervals for Mean Response Prediction Intervals Analysis of Variance For Regression Calculations for Regression Inference Inference for Correlation</p>	<p>Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course</p>	<p>G4</p> <p><i>Statistical inference guides the selection of appropriate models.</i> Models and data interact in statistical work: models are used to draw conclusions from data, while the data are allowed to criticize and even falsify the model through inferential and diagnostic methods. Inference from data can be thought of as the process of selecting a reasonable model, including a statement in probability language, of how confident one can be about the selection.</p>
Week 28	<p>9.2 Multiple Linear Regression Statistical Model for Multiple Regression Estimation, Confidence Intervals, and Significance Tests A Case Study</p>	<p>Introduction to the practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course</p>	<p>G4</p> <p><i>Statistical inference guides the selection of appropriate models.</i> Models and data interact in statistical work: models are used to draw conclusions from data, while the data are allowed to criticize and even falsify the model through inferential and diagnostic methods. Inference from data can be thought of as the process of selecting a reasonable model, including a statement in probability language, of how confident one can be about the selection.</p>
Week 29	<p>Chapter 10 Analysis of Variance</p>	<p>Introduction to the</p>	<p>G4</p>

<p>Week 30</p>	<p>10.1 One-Way Analysis of Variance Comparing Means The ANOVA Model The ANOVA Table and the F Test Contrasts Multiple Comparisons Power</p> <p>10.2 Two-Way Analysis of Variance Advantages of Two-Way ANOVA The Two-Way ANOVA Model Main Effects and Interactions ANOVA Table for Two-Way ANOVA</p>	<p>practice of statistics</p> <p>David S. Moore George P. McCabe</p> <p>Calculator, TI – interactive is used throughout the course</p>	<p><i>Statistical inference guides the selection of appropriate models.</i> Models and data interact in statistical work: models are used to draw conclusions from data, while the data are allowed to criticize and even falsify the model through inferential and diagnostic methods. Inference from data can be thought of as the process of selecting a reasonable model, including a statement in probability language, of how confident one can be about the selection.</p>
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