

Haverhill High School

Probability & Statistics

Curriculum Map

2006 – 2007

Grades 10, 11, 12

Curriculum Committee Members

Patricia Giampa

Bethe McBride

Probability and Statistics

General Outline:

Term	Topic(s)	Chapters (Text*)
1	<i>Exploratory Analysis & Descriptive Statistics</i>	1 A Case Study 2 Exploring Distributions 3 Relationships Between Two Quantitative Variables 4 Sample Surveys and Experiments
	<i>Planning & Conducting a Study</i>	
2	<i>Probability</i>	10 Sampling Distributions (YMS) 5 Sampling Distributions 6 Probability Models 7 Probability Distributions
3	<i>Statistical Inference</i>	13 Confidence Intervals: the Basics (YMS) 14 Tests of Significance: the Basics (YMS) 8 Inference for Proportions 9 Inference for Means 10 Inference for Regression
4	<i>Statistical Inference</i>	11 Chi-Square Tests
	Review & Final Exam Final Project	12 Case Studies

*Textbooks:

Watkins, Scheaffer & Cobb, *Statistics in Action* (WSC). Used unless specified otherwise.

Yates, Moore & Starnes, *Basic Practice of Statistics* (YMS)

Saunders, *Statistic and Probability in Modern Life*

Additional Resources:

Technology: TI 83 Graphing Calculators; Minitab Statistical Software

Videos: “Against All Odds,” “Breaking Vegas,” “DTD Series”

Reading “Statistics, A Guide to the Unknown”, 4th ed. (or editions 2 – 4)

“Bringing Down the House” “How to Lie with Statistics”

Instructional Activities

Direct Instruction

Cooperative Learning

Class Exercises / Activities

Real Life Applications

Homework Exercises

Study Guides / Chapter Reviews

Spiral Activities

Technology Integration

Portfolios

Integrated Skills Project

Assessment

Multi-section Quiz

Chapter Test

Classwork Assessment

Homework Assessment

Graphing Calculator Assessment

Computer Lab Assessment

Portfolio Assessment

Project Assessment

TERM 1

Topic	Chapters and Topics	Timeline
<i>Exploratory Analysis & Descriptive Statistics</i>	1 <u>A Case Study - WESTVACO</u>	Week 1
	2 <u>Exploring Distributions</u> <ul style="list-style-type: none"> • Graphical Displays of Distributions • Measures of Center & Spread • The Normal Distribution 	Weeks 2 - 4
	3 <u>Relationships Between Two Quantitative Variables</u> <ul style="list-style-type: none"> • Scatterplots • Lines of best fit & least square regression • Correlation • Diagnostics & Residuals 	Weeks 5 - 7
<i>Planning & Conducting a Study</i>	4 <u>Sample Surveys and Experiments</u> <ul style="list-style-type: none"> • Rationale & methods for sampling • Randomization • Experiments and Inference about Cause • Designing Experiments to Reduce Variability 	Weeks 8 – 9

Learning Standards:

- 12.D.2 Select an appropriate graphical representation for a set of data and use appropriate statistics (e.g., quartile or percentile distribution) to communicate information about the data.
- 12.D.5 Describe a set of frequency distribution data by spread (i.e., variance and standard deviation), skewness, symmetry, number of modes, or other characteristics. Use these concepts in everyday applications.
- 12.D.4 Apply uniform, normal, and binomial distributions to the solutions of problems.
- 12.D.3 Apply regression results and curve fitting to make predictions from data.
- 12.D.1 Design surveys and apply random sampling techniques to avoid bias in the data collection.
- 12.D.7 Compare the results of simulations (e.g., random number tables, random functions, and area models) with predicted probabilities.

AP Course Outline:

- I. Exploring Data: Describing Patterns and departures from patterns (20% - 30%):
 - A. Constructing & Interpreting Graphical Displays of Distributions of Univariate Data
 - B. Summarizing Distributions of Univariate Data
 - C. Comparing Distributions of Univariate Data.
 - D. Exploring Bivariate Data
 - E. Exploring Categorical Data.
- II. Sampling and Experimentation: Planning & Conducting a Study (10% - 15%)
 - A. Overview of methods of data collection
 - B. Planning & conducting surveys
 - C. Planning & conducting experiments
 - D. Generalizability of results and types of conclusions from observational studies, experiments and surveys

TERM 2

Topic	Chapters & Topics	
<i>Probability</i>	9 YMS <u>Introducing Probability</u> <ul style="list-style-type: none">• Idea of Probability• Randomness• Probability Models•	Weeks 10 - 12
	6 <u>Probability Models</u> <ul style="list-style-type: none">• Samples Spaces with Equally Likely Outcomes• Addition Rule & Disjoint Events• Conditional Probability• Independent Events	Weeks 13 – 15
	7 <u>Probability Distributions</u> <ul style="list-style-type: none">• Random Variables & Expected Value• Binomial Distribution• Geometric Distribution	Weeks 16 – 18
	10 YMS <u>Sampling Distributions</u> <ul style="list-style-type: none">• Parameters and Statistics• Estimation & Law of Large Numbers• Sampling Distributions• Sampling Distribution of sample mean• Central Limit Theorem• Statistical Process Control	

Learning Standards:

- 12.D.4 Apply uniform, normal, and binomial distributions to the solutions of problems.
- 12.D.6 Use combinatorics (e.g., “fundamental counting principle,” permutations, and combinations) to solve problems, in particular, to compute probabilities of compound events. Use technology as appropriate.
- 12.D.7 Compare the results of simulations (e.g., random number tables, random functions, and area models) with predicted probabilities.

AP Course Outline:

- III. Anticipating Patterns; Exploring random phenomena using probability and simulation (20% - 30%)
- A. Probability
 - B. Combining independent random variables
 - C. The normal distribution
 - D. Sampling distributions

TERM 3

Topic	Chapters	
<i>Statistical Inference</i>	13 YMS <u>Confidence Intervals: The Basics</u> <ul style="list-style-type: none"> • Estimating with Confidence • Confidence intervals for the population mean • How confidence intervals behave • Choosing the sample size 	Weeks 19 - 20
	14 YMS <u>Tests of Significance: The Basics</u> <ul style="list-style-type: none"> • Reasoning of tests of significance • Stating hypotheses • Test statistics, P-values, Statistical significance • Tests of a population mean • P-values and significance levels • Tests from confidence intervals 	Weeks 21 - 22
	9 Inference for Proportions <ul style="list-style-type: none"> • Estimating a Proportion with Confidence • Testing a Proportion • Confidence Interval & Significance Test for Difference of Two Proportions 	Weeks 23 – 24
	10 Inference for Means <ul style="list-style-type: none"> • Toward a Confidence Interval & Significance Test for Mean • Estimating Sigma: The T-Distribution • Effect of Long Tails and Outliers • Inference for Difference Between Two Means • Paired Comparison 	Weeks 25 - 26

Learning Standards:

- 12.D.4 Apply uniform, normal, and binomial distributions to the solutions of problems.

AP Course Outline:

IV. Statistical Inference: Estimating population parameters and testing hypotheses (30% - 40%)

A. Estimation (point estimators & confidence intervals)

- Estimating population parameters and margins of error
- Properties of point estimators – unbiasedness and variability
- Logic, meaning and properties of confidence intervals and confidence level
- Large sample confidence interval for proportion and difference between two proportions
- confidence interval for a mean and difference between two means (unpaired and paired)
- confidence interval for the slope of a least square regression line

B. Tests of Significance

- Logic of significance testing, null and alternative hypotheses; p-values; one and two-sided tests; concept of type I and type II errors; concept of power
- Large sample test for a proportion and test for difference between two proportions
- Large sample test for a mean and test for difference between two means

TERM 4

Topic	Chapters	
<i>Statistical Inference</i>	11 <u>Chi-Square Tests</u> <ul style="list-style-type: none">• Testing a Probability Model: Chi-Square Goodness of Fit Test• Chi-Square test of Homogeneity• Chi-Square Test of Independence	Weeks 27 - 28
	12 <u>Inference for Regression</u> <ul style="list-style-type: none">• Variation in the estimated slope• Making inferences about slope• Transforming for a better fit	Weeks 29 - 30
Review & Final Exam	NA	Weeks 31 - 32
Final Project	NA	Weeks 33 - 36

Learning Standards:

- 12.D.3 Apply regression results and curve fitting to make predictions from data.
- 12.D.4 Apply uniform, normal, and binomial distributions to the solutions of problems.

AP Course Outline:

IV. Statistical Inference: Estimating population parameters and testing hypotheses (30% - 40%)

A. Estimation (point estimators & confidence intervals)

- confidence interval for the slope of a least square regression line

B. Tests of Significance

- Chi-square test for goodness of fit, homogeneity of proportions and independence (one- and two-way tables)
- Test for slope of least square regression line