

Masconomet Regional High School Curriculum Guide

COURSE TITLE:	<u>Applied Statistics</u>	COURSE NUMBER:	<u>1432</u>
DEPARTMENT:	<u>Mathematics</u>	GRADE LEVEL(S) & PHASE:	<u>11 – 12 , CP</u>
LENGTH OF COURSE:	<u>One Semester</u>		

Course Description:

This one semester course introduces students to statistics, the science concerned with collection, analysis and interpretation of numerical information. Even though numerical information is encountered everywhere – in newspapers and magazines, on radio and television – few people have the training to interpret such information critically and use it effectively. This course is an ideal introduction for those students interested in a variety of disciplines including psychology, sociology, business, data processing computer science, biology, education, health fields, economics, ecology, and agriculture. Students will consider intuitive notions of randomness, representativeness and bias to enhance their ability to evaluate statistical claims. In addition, students will consider the differences between experimental and theoretical probability. Concepts of probability, such as independent and dependent events, and their relationship to compound events and conditional probability will be considered intuitively.

Objectives:

(Some are adapted from the Massachusetts Mathematics Curriculum Framework – November 2000)

At the end of the course, the student will be able to:

- A. Construct charts, tables and graphs that summarize data from real world situations.
- B. Draw inferences from data presented in charts, tables and graphs.
- C. Use sampling and recognize its role in statistical claims.
- D. Apply measurements of central tendency, variability and correlation.
- E. Use curve fitting to make predictions based on limited data.
- F. Design a statistical experiment to study a problem, conduct the experiment and interpret and communicate the outcomes.
- G. Use simulations to estimate probabilities.
- H. Use experimental or theoretical probabilities, as appropriate, to represent and solve problems involving uncertainty.
- I. Create and interpret discrete probability distributions.

These objectives address the Academic Expectations relating to effective communication, mathematical competency and problem solving skills.

Materials and Activities:

Text(s): Understanding Basic Statistics; 4th edition

By: Charles Henry Brase and Corrinne Pellillo Brase
Houghton Mifflin Company: Boston, MA: 2007

Students are expected to have and use a graphing calculator in class and when doing assignments. Parents may request that their child borrow a school owned calculator for the year.

- Discovery activities to introduce new concepts and to provide hands-on experience concerning the usefulness of these concepts.
- Lecture and class discussion to explain concepts and processes. Individual and group work to practice skills presented in class, to apply them to various problem-solving situations and to develop their ability to work cooperatively in such situations.
- Student assignments to develop proficiency in those skills and processes presented and practiced in class.
- Group and individual investigations related to understanding and applying the concepts of the central objectives.

Scope and Sequence:

At the end of chapter one, students will be able to:

- Identify the variables in a statistical study
- Distinguish between quantitative and qualitative variables
- Identify populations and samples
- Determine the level of measurement for a data set
- Compare descriptive and inferential statistics
- Explain the importance of random samples
- Describe various types of sampling

- Simple random sample
- Stratified sample
- Systematic sample
- Cluster sample
- Convenience sample
- Describe situations, specifically from business, in which each type of sample might be useful
- Use the random number generator of a graphing calculator to generate a random sample of distinct values
- Discuss what it means to take a census
- Describe and distinguish between simulations, observational studies and experiments
- Identify control groups, placebo effects and randomized two-treatment design

At the end of chapter two, students will be able to:

- Organize raw data using a frequency table
- Construct histograms and relative frequency histograms
- Recognize basic distribution shapes (uniform, symmetric, skewed and bimodal)
- Interpret graphs in the context of the data's setting
- Determine types of graphs appropriate for specific data
- Construct bar graphs, Pareto charts, circle graphs and time-series graphs
- Interpret data displayed in graphs
- Construct a stem and leaf display from raw data
- Use a stem and leaf display to visualize data distribution
- Compare a stem and leaf display to a histogram

At the end of chapter three, students will be able to:

- Compute mean, median and mode from raw data
- Interpret mean, median and mode in the context of the data set
- Explain how mean, median and mode can be affected by extreme data values
- Compute a weighted average
- Find the range, variance and standard deviation of a data set
- Compute the coefficient of variance for a data set and interpret its significance
- Interpret the meaning of percentile scores
- Compute the median, quartiles and five number summary from raw data
- Make a box-and-whisker plot and interpret the results
- Explain how a box-and-whisker plot indicates the spread of data about the median
- Create and communicate about a research project (frequent deadlines will be met culminating in a professional presentation of the student's statistical findings. Variables, samples and interpretation of data will be fully detailed. The end product will be presented to the class as though they were clients.)

At the end of chapter four, students will be able to:

- Make a scatter plot
- Visually estimate the location of the line of best fit for a scatter plot
- Use sample data to compute the sample correlation coefficient r and investigate its meaning
- Use linear regression to find the equation for the line of best fit and r
- Explain the difference between interpolation and extrapolation

At the end of chapter five, students will be able to:

- Assign probabilities to events
- Explain how the law of large numbers relates to relative frequencies
- Apply basic rules of probability to everyday events
- Explain the relationship between statistics and probability

Assessment:

- Daily assignments to be evaluated in light of their completeness, care of presentation and the student's ability to explain the results. Late or incomplete assignments can earn at most half credit. Generally, no credit will be given for any assignment not completed within one day of the time it was due.
- Individual and group classwork/investigations to be evaluated in light of their completeness, care of presentation, student participation in the process and the student's ability to discuss the results/conclusions.

- Frequent vocabulary quizzes (announced or unannounced) to assess the student's progress in achieving course objectives on a short-term basis.
- Chapter tests to assess the student's ability to synthesize several classes and achieve course objectives on a long-term basis.
- Chapter projects will be assigned to be completed the day after a chapter test. Projects will include individual and group work.
- For students not going on the senior internship there will be an end of course project with in class presentation due in June.
- Assessments designed to determine how the student has met the Academic Expectations relating to effective communication, mathematical competency and problem solving skills.

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