Farmingdale State College
State University of New York

CHARLES E. GORTON HIGH SCHOOL

PROBABILITY & STATISTICS

SYLLABUS

Instructor: Kenneth Texler **Website**: www.yonkerspublicschools.org/ktexler

Course Title: Statistics

Course Code: MTH221

Credits: HS (1) College (3)

Course Description:

In this course, we will cover a range of topics, some which include: independent events, dependent probability, combinatorics, hypothesis testing, descriptive statistics, random variables, probability distributions, regression, and inferential statistics. Our lives are full of probabilities! Statistics is related to probability because much of the data we use when determining probable outcomes comes from our understanding of statistics.

Instruction for this course will include a combination of traditional, teacher-led instruction, and student-centered learning experiences using a variety of instructional modalities; including but not limited to: use of graphing calculators, computer-based applications (ex. EngageNY, Khan Academy, Microsoft Excel, etc.) and real-world, experiential learning activities. There will be a minimum of 2 periods per week of lab time; where students will be working on computer applications.

Prerequisites:

Successful completion of any two credits of high school mathematics courses such as: Algebra [MTH-149], Geometry [MTH-350], and/or Algebra II /Trigonometry [MTH-360].

Textbook and Supplies:

Text: *Essentials of Statistics*, 6th ed.
Authors: Mario F. Triola
Publisher: Pearson

Calculator: All students will be required to have access to a calculator with two-variable statistical capabilities. The TI-83 and TI-84 series of calculators will most likely be used in school.

Software: Khan Academy (website) and Microsoft Excel or other compatible spreadsheet software will be used throughout the course.

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Grading for Course:

Grading for this course will include the following categories:

1. Classwork/Homework/Formative Assessments 80%
2. Exams 20%

In addition, there will be a quarterly cumulative exam at the end of 1st and 3rd marking periods that will count for 10% of the marking period grade, and a cumulative mid-term and final exam at the end of 2nd and 4th marking periods that will account for 10% of the annual grade; as per Yonkers Public Schools grading policy.

Final Project:

The final project will account for 100% of the students' 4th marking period grade. Each student or group of students, will be required to complete a Research Project consisting of a survey that will demonstrate the student's knowledge and understanding of Statistics.

Behavioral Expectations:

Students will be expected to arrive to class each day on time with all necessary supplies and with a willingness to participate in daily lessons and activities. Students will be expected to treat each other, the computers, and classroom with respect and dignity.

Curriculum and Units of Study:

Unit 1: Analyzing Categorical Data

- Individuals, variables, and categorical & quantitative data
- Read pictures graphs
- Create bar graphs
- Read bar graphs and solve 2-step problems
- Read two-way frequency tables
- Create two-way frequency tables
- Create two-way relative frequency tables
- Reading two-way relative frequency tables
- Interpreting two-way tables
- Identifying marginal and conditional distributions
- Marginal distributions
- Conditional distributions

Unit 2: Displaying and Comparing Quantitative Data

- Create frequency tables
- Create dot plots
- Reading dot plots & frequency tables
- Create histograms
- Read histograms
- Reading stem and leaf plots
- Shape of distributions
- Clusters, gaps, peaks, & ouliers
- Comparing distributions

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- Comparing data displays
- Comparing data distributions
- Comparing center and spread

Unit 3: Summarizing Quantitative Data

- Mean, median, and mode
- Calculating the mean
- Calculating the median
- Calculating the mean: data displays
- Calculating the median: data displays
- Effects of shifting, adding, & removing a data point
- Missing value given the mean
- Median & range puzzlers
- Interquartile range (IQR)
- Standard deviation of a population
- Variance
- Sample and population standard deviation
- Creating box plots
- Reading box plots
- Interpreting quartiles
- Identifying outliers
- Mean absolute deviation (MAD)

Unit 4: Modeling Data Distributions

- Calculating percentiles
- Calculating z-scores
- Transforming data
- Properties of density curves
- Area under density curves
- Empirical rule
- Normal distribution: Area above or below a point
- Normal distribution: Area between two points
- Normal calculations in reverse

Unit 5: Exploring Bivariate Numerical Data

- Constructing scatter plots
- Making appropriate scatter plots
- Positive and negative linear associations from scatter plots
- Describing trends in scatter plots
- Correlation coefficient intuition
- Eyeballing line of best fit
- Estimating equations of lines of best fit, and using them to make predictions
- Estimating slope of line of best fit
- Calculating and interpreting residuals
- Calculating the equation of the least-square line
- Interpreting slope and y-intercept for linear models
- Residual plots
- Influential points

Unit 6: Study Design

- Statistical questions
- Valid claims
- Making inferences from random samples

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- Identifying the population and sample
- Using probability to make fair decisions
- Simple random samples
- Sampling methods
- Types of statistical studies
- Experiment designs

Unit 7: Probability

- Simple probability
- Comparing probability
- Subsets of sample spaces
- Basic set notation
- Experimental probability
- Making predictions with probability
- Interpreting results of simulations
- Adding probabilities
- Two-way tables, Venn diagrams, and probability
- Sample spaces for compound events
- Independent probability
- Probabilities of compound events
- Probability of "at least one" success
- Dependent probability
- Calculating conditional probability
- Dependent and independent events

Unit 8: Counting, Permutations, and Combinations

- The counting principle
- Permutations
- Combinations
- Permutations and combinations
- Probability with permutations and combinations

Learning Practices and Standards:

As per New York State Department of Education regulations, this course will be following the *NYS Common Core Mathematical Practices* and *Learning Standards for High School Statistics & Probability*.

Learning Practices:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Learning Standards:

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- S-ID: Interpreting Categorical & Quantitative Data
- S-IC: Making Inferences & Justifying Conclusions
- S-CP: Conditional Probability & the Rules of Probability
- S-MD: Using Probability to Make Decisions