

AP Statistics/H NC Math 4 Math Syllabus

Course Design

This is a course designed for students to achieve advanced placement credit. This course is high in academic rigor and work. Students will be expected to complete homework on a nightly basis and pre-read the next day's section. Students must be able to keep up with this advanced pace by attending class daily, doing homework nightly, and keeping a neat and organized notebook. Students must also be able to express their ideas, verbally, or written, with ease. Students will be conducting experiments and analyzing data. The ability to write a cohesive report that analyzes the data is a very important piece of the AP Statistics class.

This course will conclude with the AP exam on May 4. **All students are expected to take this exam.**

Please visit myap.collegeboard.org/login and create an account. Then add the class using the following code 3EVMDZ.

Materials

1. Dividers
2. 1.5 inch binder
3. College ruled notebook paper
4. Pencils and erasers
5. Highlighters
6. TI-84 Plus CE graphing calculator (if this is not possible, please speak to me privately)
7. Earbuds that can be plugged into the laptop
8. Additional supplies when requested (ie Skittles, M&Ms etc)

Course Projects

Throughout the school year, we will be completing **several** course projects that apply to statistics. These course projects will be accompanied by a rubric that will explain the details of how the project will be assessed.

Grading Policy

Marking period grades are calculated by adding the total points (tests, quizzes, homework, projects, etc.) and dividing by the total number of points possible.

Topics Covered in AP Statistics

Exploring Data: Describing Patterns and Departures from Patterns

- **Exploring Data**
 - What is statistics?
 - Variables, values
 - Random sampling introduction, importance of randomness
 - Dotplots, stemplots, outliers by hand
 - Dotplots, stemplots, outliers utilizing the TI technology
 - Skewness, outliers, influential points
 - Frequency distributions
 - Mean/median, quartiles, IQR, box plots, range
 - S.D. & variance as a measure of variability
- **Describing Location in a Distribution**
 - Normal curve, empirical rule, z-score
 - Density curves, percentile, using the z-table
 - Z-scores
 - Determining normality, above, below, and in between
- **Examining Relationships**
 - Intro to examining relationships
 - Scatterplots, correlation, and least squares regression for data that is approximately linear utilizing technology
 - Residual plots, influential points
- **Relationships between two Variables**
 - Transforming relationships using logarithmic transformations to achieve linearity
 - Power and exponential transformations
 - Non-linear data- interpreting models
 - Tables & categorical data
 - Simpson's paradox- recognize and identify
 - Marginal and conditional probabilities
 - Lurking variables, common response, causation and confounding
 - Using table data to generate graphs and explore relationships between variables

Sampling and Experimentation: Planning and Conducting a Study

- **Producing Data**
 - Observations vs. Experiments
 - Sampling methods- population vs. sample, observational study vs. experiment, voluntary response, convenience, cluster, and systematic
 - Designing Experiments
 - Block designs, matched pairs, confounding, controls, blinding, placebos
 - Simulations: using random number generators to simulate experiments- Use calculator technology to generate numbers.

- Methods of sampling: systematic, stratified, cluster, judgement & convenience

Anticipating Patterns: Exploring Random Phenomena Using Probability and Simulation

- **Probability and Simulation: The Study of Randomness**
 - Sample space, outcome, events
 - Importance of randomness
 - Law of large/small numbers, mean of a random variable
 - Two-way tables, independence, conditional probability
 - Experimental probability
 - Probability rules, notation
 - Independent, mutually exclusiveness, addition rule
 - Independence, multiplication rule
- **Random Variables**
 - Discrete random variable, random variables
 - Review of standard normal calculations
 - Rules of mean/variance-exploration of the effect of linear transformations and combinations of random variables
 - Probability distribution
 - Probability histogram, uniform distribution
 - Combining normal random variables- calculations and interpretation of expected value and variability of combinations of normal random variables
- **The Binomials and Geometric Distributions**
 - Binomial setting, binomial distribution, binomial coefficient
 - Binomial mean and standard deviation
 - Sampling distribution of a count, binomial probability
 - Geometric setting, use simulation to solve geometric probability problems, use technology
- **Sampling Distributions**
 - Parameter/statistics
 - Sampling variability, sampling distribution of a statistic
 - Sampling distribution, unbiased statistic, unbiased estimator
 - Normal approximation to the sampling distribution of \hat{p}
 - Central limit theorem
 - Calculations involving sampling distributions- moving towards statistical inference.

Statistical Inference: Estimating Population Parameters and Testing Hypotheses

- **Estimating with Confidence**
 - Statistical inference
 - Basic form of all confidence intervals
 - Construct and interpret a confidence interval for a population mean and for a population proportion
 - T-distribution vs. Normal Distribution
 - Degrees of freedom
 - Determine a sample size
- **Testing a Claim**
 - Logic of significance testing
 - Null hypothesis vs. alternative hypotheses

- Large sample test for a population mean
- Two-sided significance tests and confidence intervals while doing inference
- Two types of error in hypothesis testing
- Calculating beta
- Power of a tests
- **Significance Tests in Practice**
 - One-sample and paired data t-significance tests
 - One-sample confidence interval for a population proportion and the one-sample significance test for a population proportion
 - Conduct a significance test for a population proportion
- **Comparing Two Population Parameters**
 - Inference for comparing two population means
 - Confidence interval for the difference between two population means
 - Construct a confidence interval for the difference between two population proportions
 - Perform a significance test for the difference between two population proportions.
(Practice AP questions)
- **Inference for Distributions of Categorical Variables: Chi-Square Procedures**
 - Explain and conduct a chi-square goodness of fit test
 - Conditional distributions
 - Homogeneity of populations
 - Association/independence
 - Perform chi-square test on technology
- **Inference for Regression**
 - Identify the conditions necessary to do inference for regression
 - Standard error about the least squares line
 - Confidence interval for the slop of the regression line
 - Inference about the prediction
 - Conduct a test of the hypothesis that the slope of the regression line is 0 (or that the correlation is 0) in the population.

Dear parents,

Thank you so much for allowing me the opportunity to teach your young person. I know this will be a good year for all of us. Please feel free to write any pertinent information about your child below so I can be better prepared. When we work together, I know we will achieve excellence. Please email me with any questions or concerns during the semester.

Kristina Golden

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Swansboro High School

Phone number: 910-326-4300

Ms. Golden's Daily Schedule:

1st Planning

2nd AP Statistics/H NC Math 4

3rd H Math 4

4th Math 4

Vision Statement: *Together WE RISE: world experience, relationships, investment, support and engagement.*

Mission Statement: *Invest in yourself; invest in each other; invest in our future*