AP Statistics  
Tecce – Fall 2018 / Spring 2018  
Course Expectations & Syllabus

**Contact Information:**  
Room B325  
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**Course Information:**  
The purpose of Advanced Placement Statistics is to introduce students to the major concepts and tools for collecting, analyzing and drawing conclusions from data. This course is recommended for students interested in majoring in a science or social science in college. Students are exposed to conceptual themes: exploratory analysis (20-30% of exam), planning and conducting a study (10-15% of exam), probability (20-30% of exam), and statistical inference (30-40% of exam). Much independent study will be required. TI-83 or TI-84 graphing calculators are required.

**Students who take this course are expected to take the Advanced Placement Exam on Thursday, May 16th.**

**Course Materials:**  
Other Materials: binder, lined paper, pencils, colored pens, highlighters  
**Students MUST bring a graphing calculator to class everyday** (TI-84 is preferred)

**Grading:**  
Each assessment (chapter tests, quizzes, projects, graded homework, graded classwork, Khan Academy assignments, and Quick Checks) will include questions related to one of the four AP Statistics competencies. Your semester grade is based on the following competencies (all evenly weighted):

Conditional Probability & the Rules of Probability  
Interpreting Categorical & Quantitative Data  
Making Inferences & Justifying Conclusions  
Using Probability to Make Decisions

**Final Grade for AP Statistics 1 = 80%(Semester 1 Grade based on Competencies) + 20%(Midterm Exam)**  
**Final Grade for AP Statistics 2 = 80%(Semester 2 Grade based on Competencies) + 20%(Final Exam)**

Homework is due at the beginning of class at which point it will be checked or collected. Credit is based on completeness and correctness (full credit is not given unless all relevant work is shown and all problems are attempted).
Report Card comments will include feedback on how well you do the following:

- Bring the necessary materials to class (pencils, binder, paper, graphing calculator).
- Cooperate and respectfully work with your classmates and teacher.
- Help classmates when you can (and when it is appropriate).
- Ask relevant questions and be active in class discussions.
- Be responsible with your class work, homework, and assessments.
- Contribute to a positive classroom environment.
- Abide by the classroom rules and procedures.

**Policies & Procedures:**
All of Ms. Tecce’s policies and procedures are aligned with those outlined in the SHS Student Handbook.

**Absences:** You are expected to be in class every day. If you are absent, you are expected to get the notes (either from a classmate or the class website) as well as complete any missed assignments, tests, and quizzes. You are responsible for setting up a time to make up work before or after school with Ms. Tecce. *You have one day for every day missed to complete missing work.* In accordance with the Student Handbook, there are no make-ups for unexcused absences.

**Cell Phones/Personal Electronics:** *There will be no use of cell phones, iPods, or other personal electronics in the classroom unless permission is expressly given by Ms. Tecce.* After the first warning, the electronic device will be confiscated by Ms. Tecce and returned to the student at the end of the school day. After repeated infractions, the device will be sent to the Dean (please refer to the Student Handbook for consequences).

**Classroom Rules:**
1. Listen and follow directions.
2. Be helpful.
3. Take care of the classroom and materials.
4. Be respectful and polite.

**Retakes for Assessments:** Please read the retake policies (attached).

**Extra Help:**
Ms. Tecce is available everyday (unless otherwise announced) between 7:05–7:25am and 2:15–3:00pm for extra help in Room B325. Students are encouraged to come ask questions and/or work on assignments. Students are also encouraged to form study groups.

I look forward to a great semester!! Please feel free to email me questions/comments/concerns as they arise throughout the year. I remind you to visit (and bookmark) our class website for assignments, class notes, video tutorials, and supplemental study materials.

Thanks,
Ms. Kim Tecce
Course Outline: (organized by chapters in primary textbook)

Chapter 1:
- Identify the individuals and variables in a set of data.
- Classify variables as categorical or quantitative.
- Display categorical data with a bar graph. Decide if it would be appropriate to make a pie chart.
- Identify what makes some graphs of categorical data deceptive.
- Calculate and display the marginal distribution of a categorical variable from a two-way table.
- Calculate and display the conditional distribution of a categorical variable for a particular value of the other categorical variable in a two-way table.
- Describe the association between two categorical variables by comparing appropriate conditional distributions.
- Make and interpret dotplots and stemplots of quantitative data.
- Describe the overall pattern (shape, center, and spread) of a distribution and identify any major departures from the pattern (outliers).
- Identify the shape of a distribution from a graph as roughly symmetric or skewed.
- Make and interpret histograms of quantitative data.
- Compare distributions of quantitative data using dotplots, stemplots, or histograms.
- Calculate measures of center (mean, median).
- Calculate and interpret measures of spread (range, IQR, standard deviation).
- Choose the most appropriate measure of center and spread in a given setting.
- Identify outliers using the 1.5 x IQR rule.
- Make and interpret boxplots of quantitative data.
- Use appropriate graphs and numerical summaries to compare distributions of quantitative variables.

Chapter 2:
- Find and interpret the percentile of an individual value within a distribution of data.
- Estimate percentiles and individual values using a cumulative relative frequency graph (ogive).
- Find and interpret the standardized score (z-score) of an individual value within a distribution of data.
- Describe the effect of adding, subtracting, multiplying by, or dividing by a constant on the shape, center, and spread of a distribution of data.
- Estimate the relative locations of the median and mean on a density curve.
- Use the 68-95-99.7 rule to estimate areas (proportions of values) in a Normal distribution.
- Use Table A or technology to find (i) the proportion of z-values in a specified interval, or (ii) a z-score from a percentile in the standard Normal distribution.
- Use Table A or technology to find (i) the proportion of values in a specified interval, or (ii) the value that corresponds to a given percentile in any Normal distribution.
- Determine whether a distribution of data is approximately Normal from graphical and numerical evidence.

Chapter 3:
- Identify explanatory and response variables in situations where one variable helps to explain or influences the other.
- Make a scatterplot to display the relationship between two quantitative variables.
- Describe the direction, form, and strength of a relationship displayed in a scatterplot and identify outliers in a scatterplot.
- Interpret the correlation.
- Understand the basic properties of correlation, including how the correlation is influenced by outliers.
- Use technology to calculate correlation.
- Explain why association does not imply causation.
- Interpret the slope and y-intercept of a least-squares regression line.
- Use the least-squares regression line to predict y for a given x. Explain the dangers of extrapolation.
- Calculate and interpret residuals.
- Explain the concept of least squares.
• Determine the equation of a least-squares regression line using technology or computer output.
• Construct and interpret residual plots to assess whether a linear model is appropriate.
• Interpret the standard deviation of the residuals and $r^2$ and use these values to assess how well the least-squares regression line models the relationship between two variables.
• Describe how the slope, $y$-intercept, standard deviation of the residuals, and $r^2$ are influenced by outliers.
• Find the slope and $y$-intercept of the least-squares regression line from the means and standard deviations of $x$ and $y$ and their correlation.

Chapter 4:
• Identify the population and sample in a statistical study.
• Identify voluntary response samples and convenience samples. Explain how these sampling methods can lead to bias.
• Describe how obtain a random sample using slips of paper, technology, or a table of random digits.
• Distinguish a simple random sample from a stratified random sample or cluster sample. Give the advantages and disadvantages of each sampling method.
• Explain how undercoverage, nonresponse, question wording, or other aspects of a sample survey can lead to bias.
• Distinguish between an observational study and an experiment.
• Explain the concept of confounding and how it limits the ability to make cause-and-effect conclusions.
• Identify the experimental units, explanatory and response variables, and treatments in an experiment.
• Explain the purpose of comparison, random assignment, control, and replication in an experiment.
• Describe a completely randomized design for an experiment, including how to randomly assign treatments using slips of paper, technology, or a table of random digits.
• Describe the placebo effect and the purpose of blinding in an experiment.
• Interpret the meaning of statistically significant in the context of an experiment.
• Explain the purpose of blocking in an experiment. Describe a randomized block design or a matched pair design for an experiment.
• Describe the scope of inference that is appropriate in a statistical study.
• Evaluate whether a statistical study has been carried out in an ethical manner.*

Chapter 5:
• Interpret probability as a long-run relative frequency.
• Use simulation to model chance behavior.
• Describe a probability model for a chance process.
• Use basic probability rules, including the complement rule and the addition rule for mutually exclusive events.
• Use a two-way table or Venn diagram to model a chance process and calculate probabilities involving two events.
• Use the general addition rule to calculate probabilities.
• Calculate and interpret conditional probabilities.
• Use the general multiplication rule to calculate probabilities.
• Use tree diagrams to model a chance process and calculate probabilities involving two or more events.
• Determine if two events are independent.
• When appropriate, use the multiplication rule for independent events to compute probabilities.

Chapter 6:
• Compute probabilities using the probability distribution of a discrete random variable.
• Calculate and interpret the mean (expected value) of a discrete random variable.
• Calculate and interpret the standard deviation of a discrete random variable.
• Compute probabilities using the probability distribution of certain continuous random variables.
• Describe the effects of transforming a random variable by adding or subtracting a constant and multiplying or dividing by a constant.
• Find the mean or standard deviation of the sum or difference of independent random variables.
• Find probabilities involving the sum or difference of independent Normal random variables.
• Determine whether the conditions for using a binomial random variable are met.
• Compute and interpret probabilities involving binomial distributions.
• Calculate the mean and standard deviation of a binomial random variable. Interpret these values in context.
• Find probabilities involving geometric random variables.
• When appropriate, use the Normal approximation to a binomial distribution to calculate probabilities.*

Chapter 7:
• Distinguish between a parameter and a statistic.
• Use the sampling distribution of a statistic to evaluate a claim about a parameter.
• Distinguish among the distribution of a population, the distribution of a sample, and the sampling distribution of a statistic.
• Determine whether or not a statistic is an unbiased estimator of a population parameter.
• Describe the relationship between sample size and the variability of a statistic.
• Find the mean and standard deviation of the sampling distribution of a sample proportion \( \hat{p} \). Check the 10% condition before calculating \( \sigma_{\hat{p}} \).
• Determine if the sampling distribution of \( \hat{p} \) is approximately Normal.
• If appropriate, use a Normal distribution to calculate probabilities involving \( \hat{p} \).
• Find the mean and standard deviation of the sampling distribution of a sample mean \( \bar{x} \). Check the 10% condition before calculating \( \sigma_{\bar{x}} \).
• Explain how the shape of the sampling distribution of \( \bar{x} \) is affected by the shape of the population distribution and the sample size.
• If appropriate, use a Normal distribution to calculate probabilities involving \( \bar{x} \).

Chapter 8:
• Determine the point estimate and margin of error from a confidence interval.
• Interpret a confidence interval in context.
• Interpret a confidence level in context.
• Describe how the sample size and confidence level affect the length of a confidence interval.
• Explain how practical issues like nonresponse, undercoverage, and response bias can affect the interpretation of a confidence interval.
• State and check the Random, 10%, and Large Counts conditions for constructing a confidence interval for a population proportion.
• Determine critical values for calculating a C% confidence interval for a population proportion using a table or technology.
• Construct and interpret a confidence interval for a population proportion.
• Determine the sample size required to obtain a C% confidence interval for a population proportion with a specified margin of error.
• State and check the Random, 10%, and Normal/Large Sample conditions for constructing a confidence interval for population mean.
• Explain how the \( t \) distribution are different from the standard Normal distribution and why it is necessary to use a \( t \) distribution when calculating a confidence interval for a population mean.
• Determine critical values for calculating a C% confidence interval for a population mean using a table or technology.
• Construct and interpret a confidence interval for a population mean.
• Determine the sample size required to obtain a C% confidence interval for a population mean with a specified margin of error.

Chapter 9:
• State the null and alternative hypotheses for a significance test about a population parameter.
• Interpret a \( P \)-value in context.
• Determine whether the results of a study are statistically significant and make an appropriate conclusion using a significance level.
• Interpret a Type I and a Type II error in context and give a consequence of each.
• State and check the Random, 10%, and Large Counts conditions for performing a significance test about a population proportion.
• Perform a significance test about a population proportion.
• Interpret the power of a test and describe what factors affect the power of a test.
• Describe the relationship among the probability of a Type I error (significance level), the probability of a Type II error, and the power of a test.
• State and check the Random, 10% and Normal/Large Sample conditions for performing a significance test about a population mean.
• Perform a significance test about a population mean.
• Use a confidence level to draw a conclusion for a two-sided test about a population parameter.
• Perform a significance test about a mean difference using paired data.

Chapter 10:
• Describe the shape, center, and spread of the sampling distribution of \( \hat{p}_1 - \hat{p}_2 \).
• Determine whether the conditions are met for doing inference about \( \hat{p}_1 - \hat{p}_2 \).
• Construct and interpret a confidence interval to compare two proportions.
• Perform a significance test to compare two proportions.
• Describe the shape, center, and spread of the sampling distribution of \( \bar{x}_1 - \bar{x}_2 \).
• Determine whether the conditions are met for doing inference about \( \mu_1 - \mu_2 \).
• Construct and interpret a confidence interval to compare two means.
• Perform a significance test to compare two means.
• Determine when it is appropriate to use two-sample t procedures versus paired t procedures.

Chapter 11:
• State appropriate hypotheses and compute expected counts for a chi-square test for goodness of fit.
• Calculate the chi-square statistic, degrees of freedom, and \( P \)-value for a chi-square test for goodness of fit.
• Perform a chi-square test for goodness of fit.
• Conduct a follow-up analysis when the results of a chi-square test are statistically significant.
• Compare conditional distributions for data in a two-way table.
• State appropriate hypotheses and compute expected counts for a chi-square test based on data in a two-way table.
• Calculate the chi-square statistic, degrees of freedom, and \( P \)-value for a chi-square test based on data in a two-way table.
• Perform a chi-square test for homogeneity.
• Perform a chi-square test for independence.
• Choose the appropriate chi-square test.

Chapter 12:
• Check the conditions for performing inference about the slope \( \beta \) of the population (true) regression line.
• Interpret the values of \( a, b, s, SE_b, \) and \( r^2 \) in context, and determine these values from computer output.
• Construct and interpret a confidence interval for the slope \( \beta \) of the population (true) regression line.
• Perform a significance test about the slope \( \beta \) of the population (true) regression line.
• Use transformations involving powers and roots to find a power model that describes the relationship between two variables, and use the model to make predictions.
• Use transformations involving logarithms to find a power model or an exponential model that describes the relationship between two variables, and use the model to make predictions.
• Determine which of several transformations does a better job of producing a linear relationship.

**Semester 1 will likely cover Chapters 1-8**
**Semester 2 will likely cover Chapters 9-12 as well as practice for the AP Stats Exam and a Project**