COSBY HIGH SCHOOL

COURSE SYLLABUS

COURSE NAME: State Dual Credit Introduction to Statistics

YEAR: 2025/2026

INSTRUCTOR: Mrs. Tina Williamson, CHS 119, Phone **(423) 487-5602** and through the ParentSquare APP
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Tutoring: 3:15-3:45 PM or by appointment

COURSE OUTCOMES:

COURSE DESCRIPTION**:** What is State Dual Credit? Local dual credit is a high school course aligned to a local postsecondary institution's course and exam. Students who pass the exam earn credits that are accepted and/or recognized by the local postsecondary institution. Courses are taught by licensed high school teachers or certified college instructors approved by the school system and the postsecondary institution.

Introductions to Statistics: An introduction to probability and statistics without calculus including descriptive statistics, probability distributions, the normal distribution, testing hypotheses, the t-test, and estimates and sample sizes. Class Objectives: Following Intro to Statistics the student will have the basic mathematical skills needed to ensure successful completion of the Statewide Dual Credit Exam.

STANDARDS HYPERLINK: https://www.tn.gov/education/students/early-postsecondary/dual-credit.html

INSTRUCTION:

HOW THIS COURSE IS STRUCTURED**:** Following Intro to Statistics the student will have the basic mathematical skills needed to ensure successful completion of the Statewide Dual Credit Exam.

Topic 1: Sampling and Data

1a Understand the investigative process of statistics and differentiate between descriptive and inferential statistics.

1b Differentiate between a population and a sample.

1c Construct a simple random sample.

1d Understand the differences between stratified sampling, cluster sampling, systematic sampling, and convenience sampling.

1e Determine when samples of convenience are acceptable and how sampling bias and error can occur.

1f Identify and classify data as either qualitative or quantitative and classify quantitative data as either discrete or continuous data.

1g Display and interpret qualitative data with graphs: pie graphs, bar graphs, and pareto charts.

1h Differentiate between levels of measurement: nominal, ordinal, interval, and ratio.

1i Create a frequency distribution from a list of quantitative and/or qualitative data.

1j Calculate relative frequencies and cumulative frequencies using a frequency distribution table.

1k Understand differences between a designed experiment and an observational study.

1l Differentiate between the types of variables used in a designed experiment.

1m Understand different methods used in an experiment to isolate effects of the explanatory variable.

Topic 2: Descriptive Statistics

2a Display and interpret graphs using quantitative data including stem-and-leaf plots, line graphs, and box plots.

2b Construct a histogram from a frequency distribution table.

2c Interpret data using histograms and time series graphs.

2d Analyze a frequency distribution table and determine the sample size, class width and class midpoints.

2e Recognize, describe, and calculate the measures of locations of data: quartiles, median, five number summary, interquartile range outliers, upper and lower fences, and percentiles.

2f Distinguish between a parameter and a statistic.

2g Calculate and differentiate between different measures of center: mean, median, and mode.

2h Calculate the mean of a frequency distribution: GPA and weighted grade.

2i Interpret the shape of the distribution from a graph: normal/symmetric, skewed, or uniform.

2j Calculate and differentiate between different measures of spread: range, variance, and standard deviation.

2k Determine if a data value is unusual based on standard deviations, .

Topic 3: Probability

3a Understand and use terminology and symbols of probability.

3b List the elements of events and the sample space from an experiment.

3c Understand the concept of randomness: flipping a coin, rolling a die, and drawing a card from a standard 52 card deck.

3d Differentiate between and calculate different types of probabilities: empirical and theoretical.

3e Explain the Law of Large Numbers.

3f Calculate and interpret probabilities using the complement rule, addition rule and multiplication rule.

3g Differentiate between and calculate probabilities for different types of events: independent, dependent, with or without replacement, conditional, and mutually exclusive.

3h Use Venn diagrams and lists to solve probability problems when appropriate.

Topic 4: Discrete Random Variables

4a Identify the random variable in a probability experiment.

4b Recognize and understand discrete probability distribution functions.

4c Create a probability distribution for the values of a discrete random variable.

4d Use a probability function to determine probabilities associated with a discrete random variable.

4e Calculate and interpret the mean (expected value), variance, and standard deviation for discrete random variables and binomial probability distributions.

4f Determine when a probability distribution should be classified as a discrete binomial probability distribution, and calculate probabilities associated with such a distribution.

Topic 5: Continuous Random Variables and the Normal Distribution

5a Recognize and understand continuous probability density functions.

5b Use a probability density curve to describe a population, including a normal population.

5c Calculate and interpret the area under a probability density curve.

5d Calculate and interpret a z-score, understanding the concept of "standardizing" data.

5e Calculate and interpret z-scores using the Empirical Rule, understanding the general properties of the normal distribution: 100% is the total area under the curve, exactly 50% is to the left and right of the mean, and it is perfectly symmetric about the mean.

5f Use technology to calculate the area under the curve for any normal distribution model: left, right, and between.

5g Use technology to calculate percentiles, quartiles, and other numerical values of X for a specified area under a normal curve, including unusual values.

Topic 6: Central Limit Theorem

6a Recognize the characteristics of the mean of sample means taken from different types of populations: normal and non-normal.

6b Calculate the mean of sample means taken from different types of populations: normal and non-normal.

6c Describe how the means of samples calculated from a non-normal population might be distributed.

6d Apply the Central Limit Theorem to normal and non-normal populations and compute probabilities of a sample mean.

6e Determine whether the Central Limit Theorem can be used for a given situation.

6f Assess the impact of sample size on sampling variability.

Topic 7: Confidence Intervals

7a Read and write confidence intervals using two different forms: point estimate plus/or minus margin of error (error bound) and interval notation.

7b Calculate and interpret confidence intervals for estimating a population mean and a population proportion.

7c Calculate the margin of error (error bound) using sample statistics.

7d Predict if a confidence interval will become wider or narrower given larger or smaller sample sizes as well as higher or lower confidence levels.

7e Find the point estimate and margin of error (error bound) when given a confidence interval.

7f Estimate the sample size necessary to estimate a population mean.

7g Recognize the difference between the sample mean, x-bar, and the population mean, mu, as well as the difference between the sample standard deviation, s, and standard error of the mean, s/sqrt(n).

7h Find critical values for $z_{\alpha/2}$ and $t_{\alpha/2}$ given a value of α and degrees of freedom.

7i Estimate the sample size necessary to estimate a population proportion.

Topic 8: Hypothesis Testing

8a Determine the appropriate null and alternative hypotheses when presented with a problem.

8b Differentiate between Type I and Type II errors.

8c Understand and list the assumptions needed to conduct z-tests and t-tests.

8d Determine whether to reject or fail to reject the null hypothesis using the p-value method.

8e Determine if a test is left-tailed, right-tailed, or two-tailed.

8f Differentiate between independent group and matched pair sampling.

8g Calculate test statistics and p-values for hypotheses tests: single proportion, single mean, and difference between two means.

8h Conduct hypotheses tests for a single proportion and a single mean.

8i Test hypotheses regarding the difference of two independent means (assume the variances are not pooled).

8j Draw conclusions and make inferences about claims based on hypotheses tests.

Topic 9: Regression Correlation

9a Differentiate between the independent (explanatory variable, x) and the dependent (response variable, y) in a bivariate data set.

9b Create a scatter plot and determine the type of relationship that exists between two variables: positive or negative correlation and weak or strong correlation.

9c Calculate and interpret the correlation coefficient using technology.

9d Calculate the line of best fit and interpret the coefficient of determination.

9e Use the line of best fit to make conclusions about the relationship between two variables, understanding correlation does not imply causation.

9f Calculate a residual using the line of best fit.

9g Use the p-value to determine if a line of best fit is statistically significant.

9h For a given value of x, find the appropriate estimated value of y.

9i Distinguish between interpolated and extrapolated values and explain why interpolated values are more reliable.

9j Perform a residual analysis to check assumptions of regression.

TUTORING:

Tutoring is available on most days before and after school.

COURSE SUPPLIES**:**

- Paper/Pencils
- Notebook (needs pockets)
- Computer/Chromebook

ASSESSMENT AND GRADING:

INSTRUCTIONAL AND EVALUATION METHOD:

90 - 100% A
80 – 89% B
70 – 79% C
60 – 69% D
0 – 59% F

Homework Average counts 30%
Quiz Average counts 30%
Exam/ Project Average counts 40%

Attendance and a well-organized notebook are vital for successful completion of the course! Notebooks may be used during quizzes.

QUIZZES/HOMEWORK (30% / 30%)

1. The lowest quiz score will drop at the end of the semester. If a student misses a quiz, they will have one week to make arrangements to make up for the quiz or they will receive a zero.
2. Homework for the week will be turned in on the following Monday at the beginning of the class. Late homework will not be accepted without penalty based on how late the assignment is turned in.
3. Grades will be updated in Aspen weekly.

EXAMS (40%)

1. If an exam is missed, the student must see the teacher on the student's 1st day back in class to schedule a date to make up the exam. The exam needs to be made up within one week of the student's return to school. If a student fails to schedule a makeup exam, the exam score becomes zero.
2. Python Programming projects will count as exam grades.

Mid-Term Exam: After the second nine weeks, each student will take a comprehensive mid-term exam. Students who have missed 3 or fewer days in class during the fall semester, may be exempt for the mid-term exam.

Final-Exam: After the fourth nine weeks, each student will take a comprehensive Final Exam. Students who have missed 3 or fewer days in class during the spring semester, may be exempt for the Final exam.

State Dual Credit Exam: Near the end of the semester, every student will be required to take the Statewide Dual Credit Exam. You will have 150 minutes to take the 50 question Multiple Choice Exam. You must score 70 or above to receive Statewide Dual Credit. **Challenge Exam Date: [April 30, 2025]**

GENERAL EXPECTATIONS:

Attendance is vital for successful completion of the course!

CLASSROOM RULES**:**

1. Be prepared and in your seat before the bell rings.
2. Remain in seats until the bell rings. No clumping at the door.
3. When the intercom comes on, be still and quiet
4. Follow the school's hall pass policy
5. Stay with class during drills
6. Respect others, their property and the classroom. (the smart board is off limits without permission from the teacher)

7. Sit only at the student desks/tables
8. The intercom phone and the thermostat box are for teacher use only
9. No food or drinks in the classroom. (Water is permitted unless bottles are left in the room)

ACADEMIC HONESTY:

The teacher expects all students to refrain from acts of academic misconduct including but not limited to:

1. According to Harbrace Handbook, 15 Edition:
    a. Plagiarism is defined as "presenting someone else's ideas, research, or opinions as your own without proper documentation, even if it has been rephrased."
    b. This includes but is not limited to:
        1. Copying verbatim all or part of another's written work;
        2. Using phrases, figures, or illustrations without citing the source;
        3. Paraphrasing ideas, conclusions, or research without using the source;
        4. Using all or part of a literary plot, poem, or film without attributing the work to it's creator.
2. Cheating - construed as attempting to deceive or mislead which includes, but is not limited to the following:
    a. Utilizing old tests, projects, notes or written papers that are not your own to be turned in.
    b. Providing unauthorized information to a fellow student about exam content.
    c. Receiving unauthorized aid from any source with quizzes, examinations, or other assignments.
    d. Seeking information in an unacceptable manner during/preceding an exam or other assigned work (cheat sheet, verbal exchange, looking at another person's paper or electronic device, utilizing headphones, using textbook when the test/quiz is not an open book test/quiz, using textbook test bank etc.).
    e. Consulting with a classmate or others when taking a computerized test.
    f. Disregarding other specific policies and procedures outlined for a particular class.
    g. Utilizing unapproved technology/electronic equipment during testing (i.e.: mobile devices such as cell phones, smart devices, ChatGPT, etc.).
    h. Using the same Internet Protocol network address (IP address) as another student for testing without approval from the course faculty.
3. The use of any generative artificial intelligence (AI) tool must be cited for any assignment where it has been used and may not be used unless specifically allowed by your instructor. Please see your teacher if you have questions.

Academic Dishonesty Consequences: Students who are found guilty have the option of either redoing the assignment within a specified time-period and accepting a letter drop in grade or taking a zero on the assignment.

RELIGION IN THE CLASSROOM:

The board affirms that it is essential that the teaching about religion – and not of a religion be conducted in a factual, objective and respectful manner in accordance with the following guidelines:

Cocke County Board Policy 4.804:

Educational content which consists of religious themes shall be presented in a factual, objective, and respectful manner in accordance with the following guidelines:

1. Religious themes may be a part of the curriculum for school-sponsored activities and programs provided it is essential to the learning experience in the various fields of study and is presented objectively.

2. The inclusion of religion shall be for educational purposes only.

3. The emphasis on religious themes should be only as extensive as necessary for a balanced and comprehensive study of the curriculum. Such studies shall never be used to proselytize, establish, foster, or demean any particular religion, religious tenets, or beliefs.

4. Student-initiated expressions to questions or assignments which reflect their beliefs or non-beliefs about a religious theme shall be accommodated.