# North Polk Community Schools Pacing & Course Description Guide

| Grade Level: 10-12 | Content: Statistics | Year: 2022-2023 |
|---|---|---|

## Course Description/Rationale

This one semester course provides an introduction to the study of likely events and the analysis, interpretation, and presentation of quantitative data. Course topics include basic probability and statistics; discrete probability theory, odds and probabilities, probability trees, populations and samples, frequency tables, measures of central tendency, normal distribution and measures of variability, and presentation of data (including graphs). **A graphing calculator is recommended for this class. A TI-84 will be sufficient for this and future math classes.** (1 HS credit)

| Name of Unit | Time Frame | Essential Learning Target | Standard(s) |
|---|---|---|---|
| Descriptive Statistics | 5 weeks | • Display statistics visually and obtain information from those displays.<br>• Calculate the mean and standard deviations from data sets.<br>• Calculate z-scores | Interpreting Categorical & Quantitative Data<br><br>S-ID Summarize, represent, and interpret data on a single count or measurement variable<br><br>1. Represent data with plots on the real number line (dot plots, histograms, and box plots).(S-ID.1.)<br><br>2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.(S-ID.2.)<br><br>3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).(S-ID.3.)<br><br>4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets and tables to estimate areas under the normal curve.(S-ID.4.) |

| | | | |
|---|---|---|---|
| | | | S-ID Summarize, represent, and interpret data on two categorical and quantitative variables<br><br>5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal and conditional relative frequencies). Recognize possible associations and trends in the data.(S-ID.5.)<br><br>6. Represent data on two quantitative variables on a scatter plot and describe how the variables are related. |
| Probability | 3 weeks | • Use the Fundamental Theorem of Counting<br>• Calculate basic probabilities<br>• Calculate combinations and permutations | Conditional Probability & the Rules of Probability<br>S-CP Understand independence and conditional probability and use them to interpret data<br><br>1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).(S-CP.1.)<br><br>2. Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.(S-CP.2.)<br><br>3. Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.(S-CP.3.)<br><br>4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the |

| | | | |
|---|---|---|---|
| | | | two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.(S-CP.4.)<br><br>5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations.(S-CP.5.)<br><br>S-CP Use the rules of probability to compute probabilities of compound events in a uniform probability model<br><br>6. Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A and interpret the answer in terms of the model. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.(S-CP.6.)<br><br>7. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.(S-CP.7.)<br><br>8. (+) Apply the general Multiplication Rule in a uniform probability model, P(A and B) = P(A)P(B\|A) = P(B)P(A\|B), and interpret the answer in terms of the model.(S-CP.8.)<br><br>9. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.(S-CP.9.) |
| Discrete Probability Distributioins | 3 weeks | • Construct a discrete probability distribution<br>• Calculate the mean and standard deviation of a discrete random variable<br>• Find the probability of a distribution | Using Probability to Make Decisions<br><br>S-MD Calculate expected values and use them to solve problems<br><br>1. (+) Define a random variable for a quantity of interest by assigning a numerical value to each event in a sample space; graph the corresponding probability distribution using the same graphical displays as for data distributions.(S-MD.1.) |

| | | | |
|---|---|---|---|
| | | | 2. (+) Calculate the expected value of a random variable; interpret it as the mean of the probability distribution.(S-MD.2.)<br><br>3. (+) Develop a probability distribution for a random variable defined for a sample space in which theoretical probabilities can be calculated;<br>find the expected value.(S-MD.3.)<br><br>4. (+) Develop a probability distribution for a random variable defined for a sample space in which probabilities are assigned empirically; find the expected value.(S-MD.4.)<br><br>S-MD Use probability to evaluate outcomes of decisions<br><br>5. (+)Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.<br><br>5a. Find the expected payoff for a game of chance.(S-MD.5.)<br><br>6. (+)Use probabilities to make fair decisions.(S-MD.6.)<br><br>7.(+) Analyze decisions and strategies using probability concepts. (S-MD.7.) |
| Normal Probability Distributions | 3 weeks | • Find probabilities of normally distributed variables<br>• Find a z-score given the area under a curve.<br>• Apply the Central Limit Theorem | Interpreting Categorical & Quantitative Data<br><br>S-ID Summarize, represent, and interpret data on a single count or measurement variable<br><br>4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets and tables to estimate areas under the normal curve.(S-ID.4.) |

| | | | |
|---|---|---|---|
| | | | Making Inferences & Justifying Conclusions<br><br>S-IC Understand and evaluate random processes underlying statistical experiments<br><br>1. Understand that statistics is a process for making inferences about population parameters based on a random sample from that population.(S-IC.1.) |
| Confidence Intervals | 2 weeks | • Construct confidence intervals | Understand and evaluate random processes underlying statistical experiments (S-IC.A)<br><br>1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. (S-IC.A.1)<br><br>4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. (S-IC.B.4) |