Grade Level: 11th & 12th | **Course Title: Statistics** | **Topic/Concept: Exploring Data**

Time Allotment: 17 Days | **Unit Sequence: 1**

Major Concepts to be learned:

- Analyzing Categorical Data (1.1)
- Displaying Quantitative Data with Graphs (1.2)
- Describing Quantitative Data with Numbers (1.3)

Expected Skills to be demonstrated:

- Identify individuals & variables
- Classify variables as categorical or quantitative
- Answer questions involving marginal and conditional distributions.
- Construct bar graphs, histograms, dotplots, boxplots, and stemplots to display data sets
- Describe the overall shape, center, & spread of a distribution.
- Identify outliers using the 1.5xIQR rule

PA Standards/Anchors:

N/A

Eligible Content:

N/A

Instructional Strategies:

Cooperative groups
Lectures
Hands-on activities
Problem solving activities
Group Discussions
Note-Taking
Scientific Calculators

Assessments:

Homework Discussion & Review
Section quizzes
Chapter Test

Grade Level: 11th & 12th | **Course Title: Statistics** | **Topic/Concept: Modeling Distributions of Data**

Time Allotment: 16 Days | **Unit Sequence: 2**

Major Concepts to be learned:

- Describing Location in a Distribution (2.1)
- Normal Distributions (2.2)

Expected Skills to be demonstrated:

- Find the z-score of an observation.
- Use percentiles to locate individual values within distributions 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
- Locate the median and the mean of a density curve.
- Use the 68-95-99.7 Rule
- Use the standard normal distribution to calculate the proportion of values in a specified interval.
- Use Table A to find the percentile of a value from any Normal distribution and the value that corresponds to a given percentile.

PA Standards/Anchors:

N/A

Eligible Content:

N/A

Instructional Strategies:

Cooperative groups
Lectures
Hands-on activities
Problem solving activities
Group Discussions
Note-Taking
Scientific Calculators

Assessments:

Homework Discussion & Review
Section quizzes
Chapter Test

Grade Level: 11th & 12th | **Course Title: Statistics** | **Topic/Concept: Describing Relationships**

Time Allotment: 19 Days | **Unit Sequence: 3**

Major Concepts to be learned:

- Scatterplots & Correlation (3.1)
- Least-Squares Regression (3.2)

Expected Skills to be demonstrated:

- Identify explanatory & response variables
- Explain why association doesn't imply causation
- Use regression line to predict y for a given x.
- Make a scatterplot
- Use a calculator to find the least-squares regression line
- Calculate residuals and interpret residual plots
- Recognize outliers and potentially influential observations from a scatterplot

PA Standards/Anchors:

N/A

Eligible Content:

N/A

Instructional Strategies:

Cooperative groups
Lectures
Hands-on activities
Problem solving activities
Group Discussions
Note-Taking
Scientific Calculators

Assessments:

Homework Discussion & Review
Section quizzes
Chapter Test

Grade Level: 11th & 12th | **Course Title: Statistics** | **Topic/Concept: Designing Studies**

Time Allotment: 18 Days | **Unit Sequence: 4**

Major Concepts to be learned:

- Sampling and Surveys (4.1)
- Experiments (4.2)

Expected Skills to be demonstrated:

- Identify the population and sample in a sample survey
- Identify voluntary response samples and convenience samples
- Distinguish a simple random sample from a stratified random sample or cluster sample
- Explain how undercoverage, nonresponse, and question wording can lead to bias in a sample survey
- Distinguish between an observational study and an experiment
- Explain how a lurking variable can lead to confounding
- Identify the experimental units or subjects, explanatory variables (factors), treatments and response variables in an experiment.
- Describe a completely randomized design, randomized block design, and a matched pairs design

PA Standards/Anchors:	Eligible Content:
N/A	N/A

Instructional Strategies:		Assessments:
Cooperative groups Lectures Hands-on activities	Problem solving activities Group Discussions Note-Taking Scientific Calculators	Homework Discussion & Review Section quizzes Chapter Test

Grade Level: 11th & 12th | **Course Title: Statistics** | **Topic/Concept: Probability**

Time Allotment: 19 Days | **Unit Sequence: 5**

Major Concepts to be learned:

- Randomness, Probability, and Simulation (5.1)
- Probability Rules (5.2)
- Conditional Probability & Independence (5.3)

Expected Skills to be demonstrated:

- Use simulation to model chance behavior
- Describe a probability model for a for a chance process
- Use basic probability rules, including the complement rule and the addition rule for mutually exclusive events
- Use a tree diagram to describe chance behavior
- Use the general multiplication rule to solve probability questions
- Compute conditional probabilities
- Find the probability that an event occurs using a two-way table
- Use the multiplication rule for independent events to compute probabilities

PA Standards/Anchors:	Eligible Content:
N/A	N/A

Instructional Strategies:		Assessments:
Cooperative groups Lectures Hands-on activities	Problem solving activities Group Discussions Note-Taking Scientific Calculators	Homework Discussion & Review Section quizzes Chapter Test

Grade Level: 11th & 12th | **Course Title: Statistics** | **Topic/Concept: Random Variables**

Time Allotment: 20 Days | **Unit Sequence: 6**

Major Concepts to be learned:

- Discrete & Continuous Random Variables (6.1)
- Binomial Random Variables (6.3)

Expected Skills to be demonstrated:

- Use a probability distribution to answer questions about possible values of a random variable
- Calculate the mean and standard deviation of a discrete random variable
- Interpret mean and standard deviation of a random variable
- Determine whether two random variables are independent
- Determine whether the conditions for a binomial random variable are met
- Calculate the mean and standard deviation of a binomial random variable. Interpret these values in context.
- Compute and interpret probabilities involving binomial distributions.
- Determine whether the conditions for the Normal approximation to a binomial distribution are met.
- Use the Normal approximation to estimate probabilities in a binomial setting

PA Standards/Anchors:	Eligible Content:
N/A	N/A

Instructional Strategies:		Assessments:
Cooperative groups Lectures Hands-on activities	Problem solving activities Group Discussions Note-Taking Scientific Calculators	Homework Discussion & Review Section quizzes Chapter Test

Grade Level: 11th & 12th | **Course Title: Statistics** | **Topic/Concept: Sampling Distributions**

Time Allotment: 17 Days | **Unit Sequence: 7**

Major Concepts to be learned:

- What is a Sampling Distribution? (7.1)
- Sample Proportions (7.2)
- Sample Means (7.3)

Expected Skills to be demonstrated:

- Distinguish between parameter and statistic
- Understand the definition of a sampling distribution
- Distinguish between population distribution, sampling distribution, and the distribution of sample data
- Find the mean and standard deviation of a sampling distribution of a sample proportion for an SRS of size n from a population have proportion p of successes
- Check whether the 10% condition has been met
- Use Normal approximation to calculate probabilities involving p-hat
- Use the sampling distribution of p-hat to evaluate a claim about a population proportion
- Find the mean and standard deviation of a sampling distribution of a sample mean for an SRS of size n
- Calculate probabilities involving a sample mean when the population is Normal
- Explain how the shape of the sampling distribution is related to the shape of the population distribution
- Use the central limit theorem to help find probabilities involving a sample mean

PA Standards/Anchors:

N/A

Eligible Content:

N/A

Instructional Strategies:

Cooperative groups
Lectures
Hands-on activities
Problem solving activities
Group Discussions
Note-Taking
Scientific Calculators

Assessments:

Homework Discussion & Review
Section quizzes
Chapter Test

Grade Level: 11th & 12th **Course Title: Statistics** **Topic/Concept: Estimating with Confidence**

Time Allotment: 21 Days **Unit Sequence: 8**

Major Concepts to be learned:

- Confidence Intervals: The Basics (8.1)
- Estimating a Population Proportion (8.2)
- Estimating a Population Mean (8.3)

Expected Skills to be demonstrated:

- Understand why each of the three inference conditions – Random, Normal, & Independent – is important.
- Determine a critical value for calculating a confidence interval using a table
- Carry out the steps in constructing a confidence interval for a population proportion: define the parameter, check conditions, perform calculations, interpret results in context
- Carry out the steps in constructing a confidence interval for a population mean: define the parameter, check conditions, perform calculations, interpret results in context
- Determine the sample size required to obtain a level C confidence interval for a population proportion with a specified margin of error
- Determine the sample size required to obtain a level C confidence interval for a population mean with a specified margin of error
- Understand how the margin of error of a confidence interval changes with the sample size and level of confidence C.

PA Standards/Anchors:

N/A

Eligible Content:

N/A

Instructional Strategies:

Cooperative groups
Lectures
Hands-on activities
Problem solving activities
Group Discussions
Note-Taking
Scientific Calculators

Assessments:

Homework Discussion & Review
Section quizzes
Chapter Test

Grade Level: 11th & 12th | **Course Title: Statistics** | **Topic/Concept: Testing a Claim**

Time Allotment: 20 Days | **Unit Sequence: 9**

Major Concepts to be learned:

- Significance Tests: The Basics (9.1)
- Tests about a Population Proportion (9.2)
- Tests and a Population Mean (9.3)

Expected Skills to be demonstrated:

- State correct hypotheses for a significance test about a population parameter or mean.
- Check conditions for carrying out a test about a population proportion or mean
- Interpret P-values in context
- Interpret a Type I error or Type II error in context, and give the consequences of each
- If conditions are met, conduct a significance test about a population proportion.
- If conditions are met, conduct a one-sample t-test about a population mean.
- Use a confidence interval to draw a conclusion for a two-sided test about a population mean

PA Standards/Anchors:

N/A

Eligible Content:

N/A

Instructional Strategies:

Cooperative groups
Lectures
Hands-on activities
Problem solving activities
Group Discussions
Note-Taking
Scientific Calculators

Assessments:

Homework Discussion & Review
Section quizzes
Chapter Test