

Planned Course: Statistics		Course Number: M313	Department: Mathematics	
Unit: Producing Data		Grade Level: 10-12		
Estimated Time: 25 days		Level/Track:		Date Approved: 7/15/08
PA Academic Standards	Core Concepts (in question format) • Skills/Knowledge	Activities/Strategies/Study Skills (identify some activities as remedial or enrichment activities)	Assessments (include types and topics)	

<p>2.6.11 Statistics and Data Analysis</p> <p>A. Design and conduct an experiment using random sampling. Describe the data as an example of a distribution using statistical measures of center and spread. Organize and represent the results with graphs. (Use standard deviation, variance and t-tests.)</p> <p>B. Use appropriate technology to organize and analyze data taken from the local community.</p> <p>D. Make predictions using interpolation, extrapolation, regression and estimation using technology to verify them.</p>	<p>► How do we get good data?</p> <ul style="list-style-type: none"> • The student will be able to recognize the individuals and variables in a statistical study. • The student will be able to identify the population and the sample in a statistical study. • The student will be able to distinguish observational studies from experiments. • The student will be able to identify a sample survey and a census. <p>► What role does measurement play in statistics?</p> <ul style="list-style-type: none"> • The student will be able to explain how measuring leads to clearly defined variables in specific settings. • The student will be able to identify the 	<ul style="list-style-type: none"> – Textbook exercises – Supplemental worksheets – Simulations – Experiments – Calculator usage – Videos (“Against All Odds: Inside Statistics”, The Annenberg/CPB Collection) – Computer websites (applets, data sources, teacher resources) – Use of computer statistical packages (Data Desk and Jump-Intro) 	<ul style="list-style-type: none"> • Quizzes • Tests • Homework • Classwork and participation • Group and/or individual projects
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<p>B. Use appropriate technology to organize and analyze data taken from the local community.</p> <p>E. Determine the validity of the sampling method described in a given study.</p>	<p>instrument being used and the units of measure.</p> <ul style="list-style-type: none"> • The student will be able to evaluate the validity of a variable as a measure of a given characteristic, including the validity of a prediction. • The student will be able to explain how to reduce bias and improve reliability in measurement. • The student will be able to distinguish issues that affect validity, bias, and reliability in the measurement process. <p>► How can we be misled with data?</p> <ul style="list-style-type: none"> • The student will be able to recognize inconsistent, suspicious, and implausible numbers and arithmetic errors. • The student will be 				
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<p>E. Determine the validity of the sampling method described in a given study.</p>	<p>able to calculate percent increase or decrease correctly.</p> <ul style="list-style-type: none"> ▶ What are the characteristics of good and bad sampling? <ul style="list-style-type: none"> • The student will be able to identify the population and parameter of interest. • The student will be able to recognize bias due to voluntary response samples and other inferior sampling methods. • The student will be able to distinguish between a simple random sample and other types of random sampling. • The student will be able to use a random digit table or a random number generator to select a simple random sample from a population. 			
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<p>H. Use sampling techniques to draw inferences about large populations.</p>	<p>► What do samples tell us?</p> <ul style="list-style-type: none"> • The student will be able to distinguish between a parameter and a statistic. • The student will be able to identify bias and variability as the two types of error in estimation. • The student will be able to explain how sample surveys deal with bias and variability in their conclusions. • The student will be able to explain what the margin of error for a sample survey tells us and what “95% confidence” means. • The student will be able to use the quick method to find a margin of error for 95% confidence. 				
<p>E. Determine the validity of the sampling method described in a given study.</p>	<p>► What errors can occur when sampling?</p> <ul style="list-style-type: none"> • The student will be 				

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<p>A. Design and conduct an experiment using random sampling. Describe the data as an example of a distribution using statistical measures of center and spread. Organize and represent the results with graphs. (Use standard deviation, variance and t-</p>	<ul style="list-style-type: none"> able to distinguish between sampling and nonsampling errors. • The student will be able to recognize the presence of undercoverage, nonresponse, and wording effect as sources of error in a sample survey. • The student will be able to describe stratified, cluster, and systematic sampling and their appropriate usage. • The student will be able to appraise the reliability of a poll. <p>▶ How are good experiments designed?</p> <ul style="list-style-type: none"> • The student will be able to identify the explanatory variables, treatments, response variables, and subjects in an experiment. • The student will be able to recognize bias 				
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<p>tests.) G. Describe questions of experimental design, control groups, treatment groups, cluster sampling and reliability.</p>	<p>due to confounding of explanatory variables with lurking variables.</p> <ul style="list-style-type: none"> • The student will be able to outline the design of a completely randomized experiment using a diagram. • The student will be able to use a random digit table or generator to carry out the random assignment of subjects to groups in an experiment. • The student will be able to use matched pairs or other block designs when appropriate. • The student will be able to recognize the placebo effect and know when the double blind technique should be used. • The student will be able to recognize weaknesses in an experiment. • The student will be 				
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	<p>able to explain why a randomized comparative experiment can give good evidence for a cause-and-effect relationship.</p> <ul style="list-style-type: none"> • The student will be able to understand the key concepts of data ethics and discuss how these apply in specific settings. 		
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