

**Course Title & Number:** MAT\*H122 Statway II

**Competency Area:** **QUANTITATIVE REASONING** (Goal: Students will learn to recognize, understand, and use the quantitative elements they encounter in various aspects of their lives. Students will develop a habit of mind that uses quantitative skills to solve problems and make informed decisions.)

**Faculty submitting the Learning Outcomes:** Katie Lozo, Jane Wampler, Harry Burt, Ruth Urbina-Lilback

**Date:** 2/7/13

**[Instructions:** Please match the Learning Outcomes in the left hand column to those of the course you are submitting for Gen Ed approval. List the corresponding course outcomes in the right hand column to indicate a match.]

BOR TAP's Learning Outcomes	Corresponding Outcomes for Course Named Above
1. Represent mathematical and quantitative information symbolically, graphically, numerically, and verbally.	<b>Quadratic Functions</b> <ul style="list-style-type: none"><li>a) Represent a function algebraically and compute values of a function.</li><li>b) Describe a function verbally, algebraically, graphically, and in a table of values, and make connections among representations.</li><li>c) Examine graphically and numerically (with technology) the effect of changing a parameter within a model.</li><li>d) Make conjectures about the behavior of a function given several values of the function and a given context.</li><li>e) Solve quadratic equations by completing the square and by the quadratic formula.</li><li>f) Solve quadratic equations using technology.</li><li>g) Solve quadratic equations using technology within authentic situations.</li><li>h) Formulate a quadratic equation that models an authentic situation, and use the equation to explore the situation - including problems of maximum and minimum.</li></ul> <b>Probability Distributions</b> <ul style="list-style-type: none"><li>a) Construct and use discrete and continuous probability distributions.</li><li>b) Identify the parameters of a probability distribution.</li><li>c) Apply the normal distribution.</li><li>d) Apply the binomial distribution.</li><li>e) Model the behavior of a variable using a probability distribution.</li></ul> <b>Hypothesis Testing</b> <ul style="list-style-type: none"><li>a) Perform hypothesis tests for the population mean and population proportion.</li></ul>

	<ul style="list-style-type: none"> <li>b) Perform hypothesis tests on the difference between population means, and the difference between population proportions.</li> <li>c) Determine, in a given context, appropriate null and alternative hypotheses. Identify the conclusions that reasonably follow from a decision to reject the null hypothesis, as well as from a decision not to reject the null hypothesis.</li> <li>d) Identify the concept of statistical significance, including significance levels and P-values.</li> <li>e) Execute hypothesis tests to reach a conclusion and communicate the conclusion in context.</li> </ul>
2. Apply quantitative methods to investigate routine and novel problems. This includes calculations/procedures, mathematical and/or statistical modeling, prediction, and evaluation.	<p><b>Quadratic Functions</b></p> <ul style="list-style-type: none"> <li>a) Represent a function algebraically and compute values of a function.</li> <li>b) Describe a function verbally, algebraically, graphically, and in a table of values, and make connections among representations.</li> <li>c) Examine graphically and numerically (with technology) the effect of changing a parameter within a model.</li> <li>d) Make conjectures about the behavior of a function given several values of the function and a given context.</li> <li>e) Solve quadratic equations by completing the square and by the quadratic formula.</li> <li>f) Solve quadratic equations using technology.</li> <li>g) Solve quadratic equations using technology within authentic situations.</li> <li>h) Formulate a quadratic equation that models an authentic situation, and use the equation to explore the situation - including problems of maximum and minimum.</li> </ul> <p><b>Probability Distributions</b></p> <ul style="list-style-type: none"> <li>a) Construct and use discrete and continuous probability distributions.</li> <li>b) Identify the parameters of a probability distribution.</li> <li>c) Apply the normal distribution.</li> <li>d) Apply the binomial distribution.</li> <li>e) Model the behavior of a variable using a probability distribution.</li> </ul> <p><b>Sampling Distributions</b></p> <ul style="list-style-type: none"> <li>a) Apply the concept of a sampling distribution and the Central Limit Theorem.</li> <li>b) Construct sampling distributions for a population mean and population proportion.</li> <li>c) Model the behavior of a sample statistic using sampling distributions.</li> <li>d) Apply sampling distributions and probability to support conclusions based on data and assessing the associated risks.</li> </ul>

	<p><b>Confidence Intervals</b></p> <ul style="list-style-type: none"> <li>a) Make point and interval estimates of the mean, proportion, and difference between means.</li> <li>b) Compute confidence interval estimates and interpret confidence intervals, confidence level, and margin of error in context.</li> </ul> <p><b>Hypothesis Testing</b></p> <ul style="list-style-type: none"> <li>a) Perform hypothesis tests for the population mean and population proportion.</li> <li>b) Perform hypothesis tests on the difference between population means, and the difference between population proportions.</li> <li>c) Determine, in a given context, appropriate null and alternative hypotheses. Identify the conclusions that reasonably follow from a decision to reject the null hypothesis, as well as from a decision not to reject the null hypothesis.</li> <li>d) Identify the concept of statistical significance, including significance levels and P-values.</li> <li>e) Execute hypothesis tests to reach a conclusion and communicate the conclusion in context.</li> </ul>
<p>3. Interpret mathematical and quantitative information and draw logical inferences from representations such as formulas, equations, graphs, tables, and schematics.</p>	<p><b>Quadratic Functions</b></p> <ul style="list-style-type: none"> <li>a) Represent a function algebraically and compute values of a function.</li> <li>b) Describe a function verbally, algebraically, graphically, and in a table of values, and make connections among representations.</li> <li>c) Examine graphically and numerically (with technology) the effect of changing a parameter within a model.</li> <li>d) Make conjectures about the behavior of a function given several values of the function and a given context.</li> <li>e) Solve quadratic equations by completing the square and by the quadratic formula.</li> <li>f) Solve quadratic equations using technology.</li> <li>g) Solve quadratic equations using technology within authentic situations.</li> <li>h) Formulate a quadratic equation that models an authentic situation, and use the equation to explore the situation - including problems of maximum and minimum.</li> </ul> <p><b>Probability Distributions</b></p> <ul style="list-style-type: none"> <li>a) Construct and use discrete and continuous probability distributions.</li> <li>b) Identify the parameters of a probability distribution.</li> <li>c) Apply the normal distribution.</li> <li>d) Apply the binomial distribution.</li> <li>e) Model the behavior of a variable using a probability distribution.</li> </ul>

	<p><b>Sampling Distributions</b></p> <ul style="list-style-type: none"> <li>a) Apply the concept of a sampling distribution and the Central Limit Theorem.</li> <li>b) Construct sampling distributions for a population mean and population proportion.</li> <li>c) Model the behavior of a sample statistic using sampling distributions.</li> <li>d) Apply sampling distributions and probability to support conclusions based on data and assessing the associated risks.</li> </ul> <p><b>Confidence Intervals</b></p> <ul style="list-style-type: none"> <li>a) Make point and interval estimates of the mean, proportion, and difference between means.</li> <li>b) Compute confidence interval estimates and interpret confidence intervals, confidence level, and margin of error in context.</li> </ul> <p><b>Hypothesis Testing</b></p> <ul style="list-style-type: none"> <li>a) Perform hypothesis tests for the population mean and population proportion.</li> <li>b) Perform hypothesis tests on the difference between population means, and the difference between population proportions.</li> <li>c) Determine, in a given context, appropriate null and alternative hypotheses. Identify the conclusions that reasonably follow from a decision to reject the null hypothesis, as well as from a decision not to reject the null hypothesis.</li> <li>d) Identify the concept of statistical significance, including significance levels and P-values.</li> <li>e) Execute hypothesis tests to reach a conclusion and communicate the conclusion in context.</li> </ul>
4. Evaluate the results obtained from quantitative methods for accuracy and/or reasonableness.	Evaluate the results obtained from quantitative methods for accuracy and/or reasonableness.
	<p><b><i>Additional Outcomes</i></b></p> <p><b>Chi-Square Tests</b></p> <ul style="list-style-type: none"> <li>a) Perform goodness of fit tests, independence tests, and tests for homogeneity using the Chi-Square distribution.</li> </ul> <p><b>ANOVA</b></p> <ul style="list-style-type: none"> <li>a) Test hypotheses about the means of several populations using one-way ANOVA.</li> <li>b) Use the F-distribution to compare variances.</li> </ul>