Changes to the Course/Credit Descriptions
Algebra II

The table below shows the HSCE currently assigned to Algebra II in the left-hand column with the new course description in the right hand column. In summary we changed the following:

- Moving 4 expectations from Algebra I. These are expectations that deal with more complex calculations that detract from the conceptual focus we want in Algebra I. They connect better with some of the expectations already in Algebra II.
- Deleting one expectation based on the advice of the original writers. It was hard to clarify because it was too ambiguous and the writers agreed that the underlying concept is already addressed with several other expectations.
- Examples removed from the expectations and embedded into the clarification document.
- Addition of some expectations that are currently in Algebra I but should appear in both courses because they deal with functions in general.
- Coding changes were made to the HSCE to better balance some of the standards for MME purposes.

All changes are indicated in red, along with explanatory footnotes.

Algebra II

Original Course Description	Proposed Course Description
L1.2 Representations and Relationships	**L1.2 Representations and Relationships**
L1.2.1 Use mathematical symbols (e.g., interval notation, set notation, summation notation) to represent quantitative relationships and situations.	L1.2.1 Use mathematical symbols to represent quantitative relationships and situations.
L1.3 Counting and Probabilistic Reasoning	**L1.3 Counting and Probabilistic Reasoning**
L1.3.1 Describe, explain, and apply various counting techniques (e.g., finding the number of different 4-letter passwords; permutations; and combinations); relate combinations to Pascal's triangle; know when to use each technique.	L1.3.1 Describe, explain, and apply various counting techniques; relate combinations to Pascal's triangle; know when to use each technique.
L1.3.2 Define and interpret commonly used expressions of probability (e.g., chances of an event, likelihood, odds).	L1.3.2 Define and interpret commonly used expressions of probability.
L1.3.3 Recognize and explain common probability misconceptions such as "hot streaks" and "being due."	L1.3.3 Recognize and explain common probability misconceptions such as "hot streaks" and "being due."
L2.1 Calculation Using Real and Complex Numbers	**L2.1 Calculation Using Real and Complex Numbers**
	L2.1.3 Explain the exponential relationship between a number and its base 10 logarithm, and use it to relate rules of logarithms to those of exponents in expressions involving numbers[2].
	L2.1.5 Add, subtract, and multiply complex numbers; use conjugates to simplify quotients of complex numbers[2].
L2.1.6 Recognize when exact answers aren't always possible or practical; use appropriate algorithms to approximate solutions to equations (e.g., to approximate square roots)[1].	
L2.2 Sequences and Iteration	**L2.2 Sequences and Iteration**
L2.2.1 Find the nth term in arithmetic, geometric, or other simple sequences.	L2.2.1 Find the *n*th term in arithmetic, geometric, or other simple sequences.
L2.2.2 Compute sums of finite arithmetic and geometric sequences.	L2.2.2 Compute sums of finite arithmetic and geometric sequences.
L2.2.3 Use iterative processes in such examples as computing compound interest or applying approximation procedures.	L2.2.3 Use iterative processes in such examples as computing compound interest or applying approximation procedures.
	L2.3 Measurement Units, Calculations, and Scales[2]
	L2.3.2 Describe and interpret logarithmic relationships in such contexts as the Richter scale, the pH scale, or decibel measurements solve applied problems.

[1] Deleted
[2] Moved from Algebra I

L3.2 Understanding Error	**L2.4 Understanding Error**
L3.2.1 Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations.	L2.4.1 Determine what degree of accuracy is reasonable for measurements in a given situation; express accuracy through use of significant digits, error tolerance, or percent of error; describe how errors in measurements are magnified by computation; recognize accumulated error in applied situations.
L3.2.2 Describe and explain round-off error, rounding, and truncating.	L2.4.2 Describe and explain round-off error, rounding, and truncating.
L3.2.3 Know the meaning of and interpret statistical significance, margin of error, and confidence level.	L2.4.3 Know the meaning of and interpret statistical significance, margin of error, and confidence level.
A1.1 Construction, Interpretation, and Manipulation of Expressions	**A1.1 Construction, Interpretation, and Manipulation of Expressions**
	A1.1.1 Give a verbal description of an expression that is presented in symbolic form, write an algebraic expression from a verbal description, and evaluate expressions given values of the variables[1].
A1.1.4 Add, subtract, multiply, and simplify polynomials and rational expressions (e.g., (x – 1) (1 – x2 + 3).	A1.1.4 Add, subtract, multiply, and simplify polynomials and rational expressions
A1.1.5 Divide a polynomial by a monomial.	A1.1.5 Divide a polynomial by a monomial.
	A1.1.6 Transform exponential and logarithmic expressions into equivalent forms using the properties of exponents and logarithms including the inverse relationship between exponents and logarithms[2].
A1.2 Solutions of Equations and Inequalities	**A1.2 Solutions of Equations and Inequalities**
	A1.2.2[1] Associate a given equation with a function whose zeros are the solutions of the equation.
A1.2.5 Solve polynomial equations and equations involving rational expressions (e.g. solve $-2x(x^2 + 4x+3) = 0$;$x - (1/x + 6 = 3)$), and justify steps in the solution.	A1.2.5 Solve polynomial equations and equations involving rational expressions and justify steps in the solution.
A1.2.7 Solve exponential and logarithmic equations (e.g., $3(2^x) = 7$), $2 \ln(x + 1) = 4$), and justify steps in the solution.	A1.2.7 Solve exponential and logarithmic equations and justify steps in the solution.
	A1.2.8[1] Solve an equation involving several variables (with numerical or letter coefficients) for a designated variable,

[1] Repeated from Algebra I to apply to those expressions addressed in Algebra II (i.e. logarithmic, rational, trigonometric)
[2] Moved from Algebra I

A1.2.9 Know common formulas (e.g., slope, distance between two points, quadratic formula, compound interest, distance = rate · time), and apply appropriately in contextual situations. A1.2.10 Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals (e.g., 2sin x – I = 0 for 0 ≤ x ≤ 2).	and justify steps in the solution. A1.2.9 Know common formulas and apply appropriately in contextual situations. A1.2.10 Use special values of the inverse trigonometric functions to solve trigonometric equations over specific intervals.

	A2.1 Definitions, Representations, and Attributes of Functions[1] A2.1.1 Recognize whether a relationship (given in contextual, symbolic, tabular, or graphical form) is a function; and identify its domain and range. A2.1.2 Read, interpret, and use function notation, and evaluate a function at a value in its domain. A2.1.3 Represent functions in symbols, graphs, tables, diagrams, or words, and translate among representations. A2.1.6 Identify the zeros of a function, the intervals where the values of a function are positive or negative, and describe the behavior of a function as x approaches positive or negative infinity, given the symbolic and graphical representations. A2.1.7 Identify and interpret the key features of a function from its graph or its formula(s). **A2.2 Operations and Transformations** A2.2.1 Combine functions by addition, subtraction, multiplication, and division. A2.2.2 Apply given transformations to basic functions, and represent symbolically. A2.2.3 Recognize whether a function (given in tabular or graphical form) has an inverse and recognize simple inverse pairs
A2.3 Families of Functions A2.3.3 Write the general symbolic forms that characterize each family of functions. (e.g., $f(x) = A_0a^x$; f(x) = AsinBx)	**A2.3 Families of Functions** A2.3.1 Identify a function as a member of a family of functions based on its symbolic or graphical representation; recognize that different families of functions have different asymptotic behavior. A2.3.3 Write the general symbolic forms that characterize each family of functions. **A2.4 Models of Real-world Situations** A2.4.1 Identify the family of function best suited for modeling a given real-world

	situation A2.4.2 Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. A2.4.3 Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled.

A2.5 Exponential and Logarithmic Functions A2.5.2 Interpret the symbolic forms and recognize the graphs of exponential and logarithmic functions (e.g., f(x) = log x, f(x) = ln x.) A2.5.3 Apply properties of exponential and logarithmic functions (e.g., $a^{x+y} = a^x a^y$; log(ab)= log a + log b). **A2.9 Rational Functions** A2.9.1 Write the symbolic form and sketch the graph of simple rational functions. A2.9.2 Analyze graphs of simple rational functions (e.g., f(x) = 2x + 1/x – 1; g(x) = x/x^2 - 4) and understand the relationship between the zeros of the numerator and denominator and the function's intercepts, asymptotes, and domain. **A2.10 Trigonometric Functions** A2.10.1 Use the unit circle to define sine and cosine; approximate values of sine and cosine (e.g., sin 3, or cos 0.5); use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic. A2.10.2 Use the relationship between degree and radian measures to solve problems. A2.10.3 Use the unit circle to determine the exact values of sine and cosine, for integer multiples of Π /6 and Π /4.	**A3.2 Exponential and Logarithmic Functions** A3.2.2 Interpret the symbolic forms and recognize the graphs of logarithmic functions. A3.2.3 Apply properties of exponential and logarithmic functions. **A3.6 Rational Functions** A3.6.1 Write the symbolic form and sketch the graph of simple rational functions. A3.6.2 Analyze graphs of simple rational functions and understand the relationship between the zeros of the numerator and denominator and the function's intercepts, asymptotes, and domain. **A3.7 Trigonometric Functions** A3.7.1 Use the unit circle to define sine and cosine; approximate values of sine and cosine; use sine and cosine to define the remaining trigonometric functions; explain why the trigonometric functions are periodic. A3.7.2 Use the relationship between degree and radian measures to solve problems. A3.7.3 Use the unit circle to determine the exact values of sine and cosine, for integer multiples of Π /6 and Π /4.

A2.10.4 Graph the sine and cosine, functions; analyze graphs by noting domain, range, period, amplitude, location of maxima and minima, and asymptotes. A2.10.5 Graph transformations of basic trigonometric functions (involving changes in period, amplitude, phase, and midline) and understand the relationship between constants in the formula and the transformed graph.	A3.7.4 Graph the sine and cosine functions; analyze graphs by noting domain, range, period, amplitude, and location of maxima and minima. A3.7.5 Graph transformations of basic trigonometric functions (involving changes in period, amplitude, phase, and midline) and understand the relationship between constants in the formula and the transformed graph.
A3.1 Models of Real-world Situations Using Families of Functions A3.1.1 Identify the family of function best suited for modeling a given real-world situation A3.1.2 Adapt the general symbolic form of a function to one that fits the specifications of a given situation by using the information to replace arbitrary constants with numbers. A3.1.3 Using the adapted general symbolic form, draw reasonable conclusions about the situation being modeled. **G1.7 Conic Sections and Their Properties** G.1.7.1 Find an equation of a circle given its center and radius; given the equation of a circle, find its center and radius. G1.7.2 Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. G1.7.3 Graph ellipses and hyperbolas with axes parallel to the x- and y-axes, given equations. **S1.1 Producing and Interpreting Plots** S1.1.1 Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics. S1.1.2 Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of	**G1.7 Conic Sections and Their Properties** G.1.7.1 Find an equation of a circle given its center and radius; given the equation of a circle, find its center and radius. G1.7.2 Identify and distinguish among geometric representations of parabolas, circles, ellipses, and hyperbolas; describe their symmetries, and explain how they are related to cones. G1.7.3 Graph ellipses and hyperbolas with axes parallel to the x- and y-axes, given equations. **S1.1 Producing and Interpreting Plots** S1.1.1 Construct and interpret dot plots, histograms, relative frequency histograms, bar graphs, basic control charts, and box plots with appropriate labels and scales; determine which kinds of plots are appropriate for different types of data; compare data sets and interpret differences based on graphs and summary statistics. S1.1.2 Given a distribution of a variable in a data set, describe its shape, including symmetry or skewness, and state how the shape is related to measures of center (mean and median) and measures of variation (range and standard deviation) with particular attention to the effects of

outliers on these measures.	outliers on these measures.
S1.2 Measures of Center and Variation	**S1.2 Measures of Center and Variation**
S1.2.1 Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context.	S1.2.1 Calculate and interpret measures of center including: mean, median, and mode; explain uses, advantages and disadvantages of each measure given a particular set of data and its context.
S1.2.2 Estimate the position of the mean, median, and mode in both symmetrical and skewed distributions, and from a frequency distribution or histogram.	S1.2.2 Estimate the position of the mean, median, and mode in both symmetrical and skewed distributions, and from a frequency distribution or histogram.
S1.2.3 Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, and standard deviation.	S1.2.3 Compute and interpret measures of variation, including percentiles, quartiles, interquartile range, variance, and standard deviation.
S1.3 The Normal Distribution	**S1.3 The Normal Distribution**
S1.3.1 Explain the concept of distribution and the relationship between summary statistics for a data set and parameters of a distribution.	S1.3.1 Explain the concept of distribution and the relationship between summary statistics for a data set and parameters of a distribution.
S1.3.2 Describe characteristics of the normal distribution, including its shape and the relationships among its mean, median, and mode.	S1.3.2 Describe characteristics of the normal distribution, including its shape and the relationships among its mean, median, and mode.
S1.3.3 Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean, respectively in a normal distribution.	S1.3.3 Know and use the fact that about 68%, 95%, and 99.7% of the data lie within one, two, and three standard deviations of the mean respectively, in a normal distribution.
S1.3.4 Calculate z-scores, use z-scores to recognize outliers, and use z-scores to make informed decisions.	S1.3.4 Calculate z-scores, use z-scores to recognize outliers, and use z-scores to make informed decisions.
S3.1 Data Collection and Analysis	**S3.1 Data Collection and Analysis**
S3.1.1 Know the meanings of a sample from a population and a census of a population, and distinguish between sample statistics and population parameters.	S3.1.1 Know the meanings of a sample from a population and a census of a population, and distinguish between sample statistics and population parameters.
S3.1.2 Identify possible sources of bias in data collection and sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates.	S3.1.2 Identify possible sources of bias in data collection, sampling methods and simple experiments; describe how such bias can be reduced and controlled by random sampling; explain the impact of such bias on conclusions made from analysis of the data; and know the effect of replication on the precision of estimates.
S3.1.3 Distinguish between an observational study and an experimental study, and identify, in context, the conclusions that can be drawn from each.	S3.1.3 Distinguish between an observational study and an experimental study, and identify, in context, the conclusions that can be drawn from each.

S4.1 Probability S4.1.1 Understand and construct sample spaces in simple situations (e.g., tossing two coins, rolling two number cubes and summing the results). S4.1.2 Define mutually exclusive events, independent events, dependent events, compound events, complementary events and conditional probabilities; and use the definitions to compute probabilities. **S4.2 Application and Representation** S4.2.1 Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn diagrams, or other counting techniques. S4.2.2 Apply probability concepts to practical situations, in such settings as finance, health, ecology, or epidemiology, to make informed decisions.	**S4.1 Probability** S4.1.1 Understand and construct sample spaces in simple situations S4.1.2 Define mutually exclusive events, independent events, dependent events, compound events, complementary events and conditional probabilities; and use the definitions to compute probabilities. **S4.2 Application and Representation** S4.2.1 Compute probabilities of events using tree diagrams, formulas for combinations and permutations, Venn diagrams, or other counting techniques. S4.2.2 Apply probability concepts to practical situations, in such settings as finance, health, ecology, or epidemiology, to make informed decisions.