Mathematical Analysis – Crosswalk (Summary of Revisions): 2016 *Mathematics Standards of Learning and Curriculum Framework*

Additions (2016 SOL)	Deletions from Mathematical Analysis (2009 SOL)
- MA.2 EKS – Identify end behavior in exponential and logarithmic functions - MA.5 EKS – Classify types of discontinuity; proving continuity at a point, using the definition of limits - MA.6 EKS – Graph conic sections from equations written in vertex or standard form - MA.11 EKS – Verify two matrices are inverses using matrix multiplication - MA.13 EKS – Derive the formulas associated with arithmetic and geometric sequences and series	MA.12 EKS – Compare and contrast traditional solution methods with parametric methods
Parameter Changes/Clarifications (2016 SOL)	**Moves within Mathematical Analysis (2009 SOL to 2016 SOL)**
MA.3 – Clarified that composition of functions includes algebraic and graphical approaches	- MA.2 – [Moved to MA.3] - MA.3 –[Moved to MA.5] - MA.4 – [Moved to MA.12] - MA.5 – [Moved to MA.13] - MA.6 – [Moved to MA.14] - MA.7 – [Moved to MA.4] - MA.8 – [Moved to MA.6] - MA.9 – [Moved to MA.2] - MA.10 – [Moved to MA.9] - MA.11 – [Moved to MA.7] - MA.12 – [Moved to MA.10] - MA.13 – [Moved to MA.8] - MA.14 – [Moved to MA.11]

EKS = Essential Knowledge and Skills, referring to the column on the far right of the Curriculum Framework
EU = Essential Understandings, referring to the column on the far left of the Curriculum Framework

Comparison of Mathematics Standards of Learning – 2009 to 2016

2009 SOL		2016 SOL	
		Functions	
MA.1	The student will investigate and identify the characteristics of polynomial and rational functions and use these to sketch the graphs of the functions. This will include determining zeros, upper and lower bounds, *y*-intercepts, symmetry, asymptotes, intervals for which the function is increasing or decreasing, and maximum or minimum points. Graphing utilities will be used to investigate and verify these characteristics.	MA.1	The student will investigate and identify the properties of polynomial, rational, piecewise, and step functions and sketch the graphs of the functions.
		MA.2	The student will investigate and identify the characteristics of exponential and logarithmic functions to graph the function, solve equations, and solve practical problems. [Moved from MA.9]
MA.2	The student will apply compositions of functions and inverses of functions to real-world situations. Analytical methods and graphing utilities will be used to investigate and verify the domain and range of resulting functions. [Moved to MA.3]	MA.3	The student will apply compositions of functions and inverses of functions to practical situations and investigate and verify the domain and range of resulting functions.
		MA.4	The student will determine the limit of an algebraic function, if it exists, as the variable approaches either a finite number or infinity. [Moved from MA.7]
MA.3	The student will investigate and describe the continuity of functions, using graphs and algebraic methods. [Moved to MA.5]	MA.5	The student will investigate and describe the continuity of functions. [Moved from MA.3]
		Analytic Geometry	
		MA.6	The student will investigate, graph, and identify the properties of conic sections from equations in vertex and standard form. [Moved from MA.8]
		MA.7	The student will perform operations with vectors in the coordinate plane and solve practical problems using vectors. [Moved from MA.11]
		MA.8	The student will identify, create, and solve practical problems involving triangles. [Moved from MA.13]
		Equations	
		MA.9	The student will investigate and identify the characteristics of the graphs of polar equations. [Moved from MA.10]

2009 SOL	2016 SOL
	MA.10 The student will use parametric equations to model and solve practical problems. [Moved from MA.12]
	MA.11 The student will use matrices to organize data and will add and subtract matrices, multiply matrices, multiply matrices by a scalar, and use matrices to solve systems of equations. [Moved from MA.14]
MA.4 The student will expand binomials having positive integral exponents through the use of the Binomial Theorem, the formula for combinations, and Pascal's Triangle. [Moved to MA.12]	**Discrete Mathematics**
	MA.12 The student will expand binomials having positive integral exponents. [Moved from MA.4]
MA.5 The student will find the sum (sigma notation included) of finite and infinite convergent series, which will lead to an intuitive approach to a limit. [Moved to MA.13]	MA.13 The student will determine the sum of finite and infinite convergent series. [Moved from MA.5]
MA.6 The student will use mathematical induction to prove formulas and mathematical statements. [Moved to MA.14]	MA.14 The student will use mathematical induction to prove formulas and mathematical statements. [Moved from MA.6]
MA.7 The student will find the limit of an algebraic function, if it exists, as the variable approaches either a finite number or infinity. A graphing utility will be used to verify intuitive reasoning, algebraic methods, and numerical substitution. [Moved to MA.4]	
MA.8 The student will investigate and identify the characteristics of conic section equations in (h, k) and standard forms. [Moved to MA.6] Transformations in the coordinate plane will be used to graph conic sections. [Included in MA.6 EKS]	
MA.9 The student will investigate and identify the characteristics of exponential and logarithmic functions in order to graph these functions and solve equations and real-world problems. [Moved to MA.2] This will include the role of e, natural and common logarithms, laws of exponents and logarithms, and the solution of logarithmic and exponential equations. [Included in MA.2 EKS]	
MA.10 The student will investigate and identify the characteristics of the graphs of polar equations, using graphing utilities. [Moved to MA.9] This will include classification of polar equations, the effects of changes in the parameters in polar equations, conversion of complex numbers from rectangular form to polar form and vice versa, and the intersection of the graphs of polar equations. [Moved to MA.9 EKS]	

2009 SOL	2016 SOL
MA.11 The student will perform operations with vectors in the coordinate plane and solve real-world problems, using vectors. This will include the following topics: operations of addition, subtraction, scalar multiplication, and inner (dot) product; norm of a vector; unit vector; graphing; properties; simple proofs; complex numbers (as vectors); and perpendicular components. [Moved to MA.7]	
MA.12 The student will use parametric equations to model and solve application problems. [Moved to MA.10]	
MA.13 The student will identify, create, and solve real-world problems involving triangles. [Moved to MA.8] Techniques will include using the trigonometric functions, the Pythagorean Theorem, the Law of Sines, and the Law of Cosines. [Included in MA.8 EKS]	
MA.14 The student will use matrices to organize data and will add and subtract matrices, multiply matrices, multiply matrices by a scalar, and use matrices to solve systems of equations. [Moved to MA.11]	