

Mathematics Assessment Plan Rev. 6/15/2018

Mathematics	14-15	15-16	16-17	17-18	18-19	19-20
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MATHB1A - Precalculus I

• Upon completion the student will be able to: Defining and developing the concept of "function", including domain range, graph, inverse, and algebra of functions (addition, subtraction, multiplication, division, composition).		X				
• Upon completion the student will be able to: Techniques of graphing polynomials, rational, exponential, and logarithmic functions, using intercepts, asymptotes, multiplicity, symmetry, translations, and reflections.			X			
• Upon completion the student will be able to: Solve exponential and logarithmic equations and their applications.				X		
• Upon completion the student will be able to: Solve a system of non – linear equations and inequalities, by graphing and algebraic methods.					X	
• Upon completion the student will be able to: Apply the Fundamental Theorem of Algebra and its consequences. Determine the possibilities for rational roots of polynomial equation, and obtain information about the number of positive, negative, complex roots.						X
• Upon completion the student will be able to: Solve systems of linear equations and partial fraction decomposition.						X

MATHB1B - Precalculus II

• Upon completion the student will be able to: Convert angles from degree measure to radian measure and radians to degrees. Classify an angle in standard position by quadrant and, knowing a coordinate pair on the terminal side, use ratios to find all six trigonometric functions of any angle.		X				
• Upon completion the student will be able to: The student will become proficient in the technique of proof by mathematical induction.			X			
• Upon completion the student will be able to: The student will become proficient in solving problems related to arithmetic and geometric sequences and series. And use the binomial theorem.					X	
• Upon completion the student will be able to: Solve right triangle applications and determine exact results or rounded answers, as is appropriate. Solve application problems by using Law of Sines, Law of Cosines, or area formulas.					X	
• Upon completion the student will be able to: Graph any of the six trigonometric functions, applying any change to the period, phase shift, amplitude or vertical shift.				X		X
• Upon completion the student will be able to: Verify trigonometric identities by using reciprocal or Pythagorean identities.		X				
• Upon completion the student will be able to: Apply the appropriate trigonometric formula (half-angle formulas, double-angle formulas, addition formulas) in order to evaluate trigonometric expressions and compute trigonometric function values.			X			
• Upon completion the student will be able to: Evaluate inverse trigonometric functions (exact and approximate) and solve equations containing inverse trigonometric functions.					X	
• Upon completion the student will be able to: Find all solutions to trigonometric equations by choosing to isolate the trigonometric function, or use techniques of solving quadratic equations (factoring, square root property, quadratic formula).					X	
• Upon completion the student will be able to: Use the knowledge of trigonometry to work with 2-dimensional vectors. Find magnitude and angle of inclination.						X
• Upon completion the student will be able to: Write in standard form and graph conic sections.						X

MATHB2 - Basic Functions and Calculus for Business

• Upon completion the student will be able to: Translate application problems such as revenue, profit and cost, and then solve using calculus.		X		X		
• Apply appropriate algorithms to evaluate limits, derivatives, and integrals to formulate solutions to business applications.			X			
• Demonstrate the concepts of business calculus by communicating in written, verbal and graphical form.					X	

MATHB4A - Mathematics for Elementary School Teaching

• Upon completion the student will be able to: Use multiple problem-solving strategies and approaches to solve real-world application problems, and to develop problems for all contexts of basic number operations using whole numbers, integers, rational numbers, sets, functions, and logic.		X				
• Identify patterns and relationships between operations involving whole numbers, integers, and rational numbers, and to develop the real number system to introduce algebraic concepts within the real number system.			X			
• Develop mathematical vocabulary for use in the mathematics elementary school classroom.				X		

Mathematics	14-15	15-16	16-17	17-18	18-19	19-20
MATHB6A - Analytic Geometry/Calculus I						
• Upon completion student will be able to: Translate application problems, such as related rates, optimization, and velocity-displacement. Solve and interpret solutions using calculus.		X				
• Apply appropriate algorithms to evaluate limits, derivatives, and integrals to formulate solutions.			X			
• Demonstrate the concepts of calculus by communicating in written, verbal and graphical form.				X		
MATHB6B - Analytic Geometry/Calculus II						
• Upon completion the student will be able to: Calculate derivatives of exponential and logarithmic functions, inverse trigonometric functions, hyperbolic functions, and inverse hyperbolic functions. Identify when to use logarithmic differentiation. Solve problems involving exponential and logarithm functions.		X				
• Calculus of parametric equations. Be able to parameterize an equation. Be able to graph, differentiate, and integrate parametric equations.			X			
• Integrate exponential and logarithmic functions, and hyperbolic functions. Identify integrands that are derivatives of inverse trigonometric functions or inverse hyperbolic functions. Determine when to use u-substitution or complete the square.				X		
• Determine an appropriate method of integration and apply that method. Choose partial fractions (may first require long division), integration by parts, trigonometric substitution (use a triangle or an identity) or a combination of methods. Use numerical methods such as the trapezoidal rule or Simpson's Rule to evaluate a definite integral.				X		
• Evaluate improper integrals, as well as use L'Hopital's Rule to evaluate limits of indeterminate form and ranking of functions according to their growth rates.					X	
• Know properties of sequences. Recognize monotonic sequences and know when they converge. Test whether a sequence converges or diverges by using a limit or the Sandwich Theorem.					X	
• Be familiar with geometric series, telescoping series, and p-series. Test whether a series converges (absolutely or conditionally) or diverges. Be able to apply the nth-term test for divergence, the integral test, the direct comparison test, the limit comparison test, the ratio test, and the nth-root test. Determine radius and interval of convergence.					X	
• Additional applications such as work, volumes, arc length, area of a surface of revolution, moments and centers of mass, separable differential equations, growth and decay.						X
• Build the Taylor series, Taylor polynomial of order n, or Maclaurin series of a function. Know the form of the binomial series. Estimate the error in truncating a series. Differentiate and integrate power series.						X
• Translate rectangular coordinates to polar coordinates and polar to rectangular. Graph, calculate slope, area, or shared area of polar curves.						X
MATHB6C - Calculus III						
• Upon completion the student will be able to: Perform vector operations;		X				
• Apply Greens Stokes', and divergence theorems.			X			
• Determine equations of lines and planes;					X	
• Find the limit of a function at a point;				X		
• Evaluate derivatives and write the equation of a tangent plane at a point;					X	
• Determine differentiability;					X	
• Find local extrema and test for saddle points;					X	
• Solve constraint problems using Lagrange multipliers;						X
• Compute arc length and find the divergence and curl of a vector field;						X
• Evaluate two and three dimensional integrals;						X

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MATHB6D - Ordinary Differential Equations						
• Upon completion the student will be able to: Explain the criteria for the existence of a unique solution to an initial value problem.		X				
• Find critical points and phase portrait for autonomous differential equations. The student will also sketch solution curves based on that information.			X			
• Solve first order differential equations by separable variables, integration factors, exact equations, and substitutions. In addition, be able to find power series solutions to ordinary differential equations and apply the existence and uniqueness theorems for ordinary differential equations.				X		
• Set up differential equations to model growth and decay, Newton's Law of Warming/Cooling, mixture problems, population dynamics, and predator/prey.					X	
• Solve homogenous and non-homogenous differential equations by methods that include method of undetermined coefficients, variation of parameters, Cauchy-Euler equations, and substitutions.						X
• Solve system of linear differential equations by elimination and/or eigenvalues.					X	
• Laplace transforms to solve initial value problems.					X	
• Use numerical methods to solve initial value problems. Methods could include Euler's method, Taylor series solution, and the Runge-Kutta method.						X
MATHB6E - Elementary Linear Algebra						
• Upon completion the student will be able to: Find solutions of systems of equations using various methods appropriate to lower division linear algebra;		X				
• Upon completion the student will be able to: Use bases and orthonormal bases to solve problems in linear algebra;			X			
• Upon completion the student will be able to: Find the dimension of spaces such as those associated with matrices and linear transformations;				X		
• Upon completion the student will be able to: Find eigenvalues and eigenvectors and use them in applications; and					X	
• Upon completion the student will be able to: Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and surjectivity of functions; and properties of eigenvectors and eigenvalues.						X
MATHB21 - Special Projects in Mathematics						
• Upon completion the student will be able to: The student will demonstrate their knowledge of mathematics and its application in various settings.		X	X	X	X	X
MATHB22 - Elementary Probability and Statistics						
• Upon completion the student will be able to: Translate application problems by using inferential data analysis techniques. Analyze and interpret solutions.		X		X		
• Upon completion the student will be able to: Apply appropriate techniques of probability and probability distributions to solve problems.			X			
• Upon completion the student will be able to: Demonstrate statistical knowledge of descriptive statistics by clearly communicating concepts in written or verbal form.				X		
MATHB23 - Finite Mathematics						
• Upon completion the student will be able to: Translate application problems related to linear programming, finance, business and economics. Solve and interpret solutions.		X		X		
• Upon completion the student will be able to: Distinguish and apply appropriate formulas to solve problems involving in finance, combinatorics, and sets.			X	X		
• Upon completion the student will be able to: Distinguish between approaches related to linear programming, finance, and combinatorics in written or verbal form.				X		

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MATHB50 - Modern College Arithmetic and Pre-Algebra

• Upon completion the student will be able to: Demonstrate the ability to add, subtract, multiply, and divide whole numbers, integers, fractions, mixed numbers, and decimals.		X				
• Upon completion the student will be able to: Solve Linear Equations by: a) Using the Addition/Subtraction property of equality, b) Using the Multiplication/Division property of equality.					X	
• Upon completion the student will be able to: Translate English sentences to algebraic equations.			X			
• Upon completion the student will be able to: Simplify mathematical statements using the correct order of operations.					X	
• Upon completion the student will be able to: Calculate the perimeter and area of rectangles and triangles. Calculate the area and circumference of a circle.					X	
• Upon completion the student will be able to: Find equivalent forms of numbers (i.e. change fractions to decimals, change percents to fractions, change fractions to percents, change decimals to fractions, change decimals to percents, change percents to decimals, change mixed numbers to improper fractions, change improper fractions to mixed numbers).					X	
• Upon completion the student will be able to: Round whole numbers and decimals appropriately as directed.						X
• Upon completion the student will be able to: Apply the concept of percent to real-world applications such as sales tax, discount, and simple interest.						X
• Upon completion the student will be able to: Make conversions in the US Customary System of measurements, as well as in the Metric System.						X

MATHB60 - Beginning Algebra

• Upon completion the student will be able to: Translate application problems, such as distance, percent, and geometry by formatting an appropriate equation or inequality. Solve and interpret solutions.		X		X		
• Upon completion the student will be able to: Classify linear, rational, and quadratic functions, and apply appropriate algorithms, including factoring, graphing, and symbolic representations to find solutions.	X		X			
• Upon completion the student will be able to: Demonstrate mathematical knowledge by clearly communicating linear, exponent, and rational concepts in written or verbal form.				X		

MATHB65 - Intermediate Algebra for Statistics

• Upon completion the student will be able to: Translate application problems such as distance, percent, geometry, motion, mixture, and work by formatting an appropriate equation or inequality. Solve and interpret solutions.		X		X		
• Upon completion the student will be able to: Classify linear, rational, exponential and logarithmic functions, and apply appropriate algorithms, including factoring, graphing, and symbolic representations to find solutions.			X			
• Upon completion the student will be able to: Demonstrate mathematical knowledge by clearly communicating linear, exponent, rational, and exponential and logarithmic concepts in written or verbal form.				X		

MATHB70 - Intermediate Algebra

• Upon completion the student will be able to: Translate application problems involving motion, mixture and work by formulating appropriate equations, systems of equations or inequalities. Solve and interpret results.		X				
• Upon completion the student will be able to: Classify linear and non-linear functions, including conic and logarithmic. Apply appropriate algorithms, including factoring, graphing, and symbolic representations to find solutions.				X		
• Upon completion the student will be able to: Demonstrate mathematical knowledge by clearly communicating linear and non-linear concepts including radicals, exponential and logarithmic concepts in written or verbal form.	X			X		