

Prairie View A&M University Core Curriculum Alignment Matrix

Mathematics	
The objective of the mathematics component of the core curriculum is to develop a quantitatively literate college graduate. Every college graduate should be able to apply basic mathematical tools in the solutions of real-world problems.	
<u>Exemplary Educational Objectives</u>	MATH 2034 Calculus and Analytical Geometry III
	**The following statements below could be preceded by “The students in Math 2034 are required to...”
a) to apply arithmetic, algebraic, geometric, and statistical methods to modeling and solving real-world problems;	Equations of lines and planes, cylinders and quadric surfaces, cylindrical and spherical coordinates. Vector fields, line integrals and the Fundamental Theorem of Line Integrals.
b) to represent and evaluate basic mathematical information numerically, graphically, and analytically;	Three-dimensional coordinate system, vectors, dot product, cross product. Functions of several variables, limits, continuity, partial derivatives, tangent planes, linear approximation, chain rule, directional derivatives, gradient, maximum and minimum values Lagrange Multiplier. .
c) to expand mathematical reasoning skills and develop convincing mathematical arguments;	Stoke’ Theorem, and the Divergence Theorem. Green ‘Theorem, curl and divergence, parametric surfaces and their arrears, surface integrals
d) to use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results;	Use mathematics software MAPLE and MATLAB in lab/recitation hours. Use scientific calculators in classrooms to solve mathematical problems and judge reasonableness of results.
e) to interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them;	Vector functions and space curves, derivatives and integrals of vector functions, arc length, curvature, and motion in space.
f) to recognize the limitations of mathematical and statistical models;	

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<u>Exemplary Educational Objectives</u>	MATH 1113 College Algebra
	**The following statements below could be preceded by “The students in Math 1113 are required to...”
g) to apply arithmetic, algebraic, geometric, and statistical methods to modeling and solving real-world problems;	Simplify polynomial, radical, rational, and transcendental algebraic expressions. Solve linear, quadratic, rational, radical, absolute, and transcendental equations with one variable.
h) to represent and evaluate basic mathematical information numerically, graphically, and analytically;	Solve systems of linear equations and inequalities by substitution method and graphical method. Graph polynomial, rational, and transcendental functions.
i) to expand mathematical reasoning skills and develop convincing mathematical arguments;	Develop problem-solving skills as it relates to scientific applications. Expand binomials using the Binomial Theorem.
j) to use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results;	Use mathematics software MAPLE and MATLAB in lab/recitation hours. Use scientific calculators in classrooms to solve mathematical problems and judge reasonableness of results.
k) to interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them;	Give an elementary function evaluation of polynomial, rational, radical, absolute, and transcendental functions. To include finding the domain and range, interval of increase and decrease composition, even, odd or neither, one-to-one, and inverse of functions.
l) to recognize the limitations of mathematical and statistical models;	Write definitions, recognize and use basic mathematical and statistical concepts Understand geometric and arithmetic sequences.

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<u>Exemplary Educational Objectives</u>	MATH 1124 Calculus and Geometry I
	**The following statements below could be preceded by “The students in Math 1124 are required to...”
m) to apply arithmetic, algebraic, geometric, and statistical methods to modeling and solving real-world problems;	Solve problems involving velocity, acceleration, and speed. Compute the limit of the sum, product, and quotient of a function. Compute derivatives of trigonometric and transcendental functions. Solve optimization and projectile motion problems. Compute the ant-derivative of polynomials, trigonometric, and transcendental functions.
n) to represent and evaluate basic mathematical information numerically, graphically, and analytically;	State the definition of the derivative of a function at a point ‘a’. Use the chain, product, quotient, and power rule for the derivatives. Use the properties of integrals to evaluate integrals. Add and subtract vectors; Compute the dot and cross products of two vectors; Compute the magnitude of a vector.
o) to expand mathematical reasoning skills and develop convincing mathematical arguments;	Give the $\epsilon - \delta$ meaning the expression $\lim_{x \rightarrow a} f(x)$. Evaluate limits at infinity. Solve problems involving higher order implicit differentiation. Discuss concavity and use the first and second derivative test.
p) to use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results;	Use mathematics software MAPLE and MATLAB in lab/recitation hours. Use scientific calculators in classrooms to solve mathematical problems and judge reasonableness of results.
q) to interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them;	Define and identify continuous functions. State the fundamental Theorem of Calculus. Determine the extreme values of a function.

r) to recognize the limitations of mathematical and statistical models;	
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<u>Exemplary Educational Objectives</u>	MATH 1103 Contemporary Algebra **The following statements below could be preceded by “The students in Math 1103 are required to...”
s) to apply arithmetic, algebraic, geometric, and statistical methods to modeling and solving real-world problems;	Understand the meaning of a variable and the relationships between variables. Develop problem solving skills and model real world applications related to appropriate disciplines utilizing multiple approaches.
t) to represent and evaluate basic mathematical information numerically, graphically, and analytically;	Collect, display and interpret data using line, scatter, bar and pie chart. Develop functions based on data collected in real world applications. Understand the relationships between linear inequalities and linear programming.
u) to expand mathematical reasoning skills and develop convincing mathematical arguments;	Recognize basic mathematical patterns and use the patterns to solve problems. Demonstrate the understanding of linear equations, systems of linear equations, linear inequalities, linear programming and the applications of each.
v) to use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results;	Use mathematics software MAPLE and MATLAB in lab/recitation hours. Use scientific calculators in classrooms to solve mathematical problems and judge reasonableness of results.

w) to interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them;	Find the domain and range, interval of increase and decrease, one-to-one and the inverses of functions. Identify and determine the difference between polynomial, rational, radical, absolute and transcendental functions Demonstrate the understanding of basic graph transformations.
x) to recognize the limitations of mathematical and statistical models;	Understand the basic concepts of probability.

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<u>Exemplary Educational Objectives</u>	MATH 1123 Trigonometry **The following statements below could be preceded by “The students in Math 1123 are required to...”
y) to apply arithmetic, algebraic, geometric, and statistical methods to modeling and solving real-world problems;	Solve problems requiring the applications of certain phenomena: Sound, light, electricity, and motion. Solve triangles when given certain parts. Simplify trigonometric expressions and perform basic operations on complex numbers and trigonometric functions. Find arc lengths, angular speed, and linear velocity. Convert to its equivalent/equivalent form: function and co-function relation and inverse relation, complex and polar, radian and degrees, and half angle and double angle.
z) to represent and evaluate basic mathematical information numerically, graphically, and analytically;	Use basic graphs of trigonometric functions to graph functions of the Form: $y = a \sin (bx+c)$, $y= a \cos(bx+c)$, $y= \tan(bx+c)$, $y= a \sec bx$, $Y= a \csc bx$ and $y = a \cot bx$. Graph trigonometric relations, trigonometric functions and their inverse.
aa) to expand mathematical reasoning skills and develop convincing mathematical arguments;	Develop logical reasoning abilities via proving trigonometric identities and solving trigonometric equations. Develop formulas for finding the area of a triangle. Graph and evaluate expressions of the form $a + bi$.

bb) to use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results;	Evaluate trigonometric expressions of functions for special angles as well as those requiring use of technology or trigonometry tables. Complete an exponential project utilizing explorational technology. Use mathematics software MAPLE and MATLAB in lab/recitation hours. Use scientific calculators in classrooms to solve mathematical problems and judge reasonableness of results.
cc) to interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them;	Represent relationships among ordered pairs of numbers, geometric vectors, and polar and trigonometric forms. Recognize or classify trigonometric functions as: even, odd or neither; Having symmetry relative to a specified point or line periodic; increasing or decreasing.
dd) to recognize the limitations of mathematical and statistical models;	

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<p><u>Exemplary Educational Objectives</u></p>	<p>MATH 1153 Finite Mathematics</p> <p>**The following statements below could be preceded by “The students in Math 1153 are required to...”</p>
ee) to apply arithmetic, algebraic, geometric, and statistical methods to modeling and solving real-world problems;	Compound interest; annuities; amortization and sinking funds.
ff) to represent and evaluate basic mathematical information numerically, graphically, and analytically;	Straight lines and linear functions; cost revenue and profit functions; demand and supply functions. Break-even and Equilibrium Points. Graphing systems of linear equations and inequalities in two variables; polygonal solution set; extreme points; optional solution.
gg) to expand mathematical reasoning skills and develop convincing mathematical arguments;	Systems of Linear Equations; Matrices and Determinants; Multiplication of Matrices; Inverse of a Square Matrix; Leontief Input – Output Model (Optional). Sets and set operations; number of elements in a finite set; the multiplication principle Conditional probability; Bayes theorem; Mark or chains

hh) to use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results;	Use mathematics software MAPLE and MATLAB in lab/recitation hours. Use scientific calculators in classrooms to solve mathematical problems and judge reasonableness of results.
ii) to interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them;	Distribution of random variables; expected values; variance and standard deviation; the binomial distribution; the normal distribution; applications of the normal distribution.
jj) to recognize the limitations of mathematical and statistical models;	Permutations and combinations Experiments, sample spaces and events; definition of probability; use of counting techniques in probability; rules of probability.

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<u>Exemplary Educational Objectives</u>	MATH 2003 Elementary Statistics
	**The following statements below could be preceded by “The students in Math 2003 are required to...”
kk) to apply arithmetic, algebraic, geometric, and statistical methods to modeling and solving real-world problems;	Detect the number of outcomes of events by using the multiplicative rules; Find the number of outcomes of events by using permutation rules; Determine number of possibilities using combination rules. Classical, empirical and subjective probability; Probability of a simple event and its complement; Mutually exclusive events and the addition rule of probability; Conditional probability.
ll) to represent and evaluate basic mathematical information numerically, graphically, and analytically;	Display knowledge of terms related to frequency distributions. Present data in graphical form. The standard normal distribution; The central limit theorem. Scatter Plots; Correlation Coefficient; Regression – Line of Best Fit; Test for Goodness of Fit; Tests using Contingency tables; Homogeneity of proportions test.

mm) to expand mathematical reasoning skills and develop convincing mathematical arguments;	Confidence intervals and sample size for proportions; Confidence intervals for variances and standard derivations. The null and alternative hypotheses; Type I and Type II errors; Steps of hypothesis testing; Hypothesis testing on the population proportions; Hypothesis testing using p-values Tests to compare means from two independent samples; A test to compare means of two dependent samples; A test on two population proportions.
nn) to use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results;	Use mathematics software MAPLE and MATLAB in lab/recitation hours. Use scientific calculators in classrooms to solve mathematical problems and judge reasonableness of results.
oo) to interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them;	Measures of central tendencies, variations, and positions. Construction of a probability distribution; Calculation of the mean and standard deviation of a probability distribution function; Probabilities of a binomial random variable, its means and variance; The Poisson distribution, its means variance; The Hyper geometric distribution.
pp) to recognize the limitations of mathematical and statistical models;	Identify types of data. Differentiate between descriptive and inferential statistics. Standard error of estimate

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<p><u>Exemplary Educational Objectives</u></p>	<p>MATH 2024 Calculus and Analytical Geometry II</p> <p>**The following statements below could be preceded by “The students in Math 2024 are required to...”</p>
qq) to apply arithmetic, algebraic, geometric, and statistical methods to modeling and solving real-world problems;	Inverse Functions: Exponential and Logarithmic and their derivatives. Inverse trigonometric and hyperbolic functions. Improper integrals.

rr) to represent and evaluate basic mathematical information numerically, graphically, and analytically;	Review of the Fundamental Theorem of Calculus, area and volume. Volumes by cylindrical shells, work, average value.
ss) to expand mathematical reasoning skills and develop convincing mathematical arguments;	Indeterminate forms and L'Hospital's rule.
tt) to use appropriate technology to enhance mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of the results;	Arc length, surface area of revolution, application to physics and engineering (Lab) Use mathematics software MAPLE and MATLAB in lab/recitation hours. Use scientific calculators in classrooms to solve mathematical problems and judge reasonableness of results.
uu) to interpret mathematical models such as formulas, graphs, tables and schematics, and draw inferences from them;	Integration by parts, trigonometric integrals, and trigonometric substitution. Partial fractions, approximate integration, improper integrals. Sequences and series. Integral and comparison tests, other convergence tests, and power series. Representations of functions as a power series. Taylor and Maclaurin series.
vv) to recognize the limitations of mathematical and statistical models;	