NORTHERN NEW MEXICO COLLEGE

Course Number Course Name	Math 2420 Introduction to Linear Algebra and Applications
Credit Value (Breakdown of theory and lab credits)	3 Theory
Catalog Course Description	An introductory study of the analysis and applications of systems of linear equations, vector spaces, matrices, and linear transformations, including computer-based linear algebra. Prerequisite: MATH 1520. (3, 3T+0S)

Course Student Learning Outcomes/Objectives /Competencies of the Course	**Student Learning Objectives**
	1. Analyze and solve systems of equations.
	    a. Determine if a system is linear.
	    b. Determine if a system is consistent and whether or not solutions are unique.
	    c. Solve systems using row reduction and analyze the system using pivot positions and free variables.
	    d. Solve systems using matrix factorizations.
	    e. Solve systems using matrix inverses.
	    f. Apply Cramer's rule.
	2. Analyze and use the properties of vectors and vector spaces.
	    a. Use vector algebra.
	    b. Determine whether or not a set of vectors is linearly independent.
	    c. Determine whether or not a set of vectors and its operations constitute a vector space.
	    d. Determine whether or not a subset of a vector space is a subspace.
	    e. Determine whether or not a set of vectors spans or is a basis for a vector space.
	    f. Compute a basis for and determine the dimension of a vector space.
	    g. Compute the coordinates of a vector with respect to a basis.
	    h. Compute the transition matrix between two bases.
	    i. Determine whether a set and its product constitute an inner product space.
	    j. Compute lengths, angles, distances, and orthogonal projections of vectors.
	    k. Verify orthonormal bases and compute them using the Gram-Schmidt process.
	3. Analyze and use the properties of matrices and linear transformations.
	    a. Use matrix algebra.
	    b. Compute the inverse, determinant, transpose, and eigenpairs of a matrix.
	    c. Compute and apply decompositions of matrices, such as LU decompositions, singular-value decompositions, diagonalizations, and orthogonal diagonalizations of symmetric matrices.
	    d. Use the Invertible Matrix Theorem.

College-Wide Student Learning Outcomes	Math 2420 exposes students to the NNMC College Wide Goals: *Critical thought: Students are required to analyze and synthesize information and draw reasoned conclusions.* *Quantitative reasoning: Calculate, represent, apply, analyze, and communicate both quantitative and qualitative information.*

Program Student Learning Outcomes measured	PSLO #3: Use linear algebra and matrices, vector analysis, ordinary differential equations, partial differential equations, or complex analysis to solve real world problems.