

1 Course objective/Learning outcomes

- Unit 1: Systems of linear equations and matrices
 - Systems of linear equations
 - Gaussian and Gauss-Jordan elimination
 - Matrices
 - Matrix operations and algebraic properties
 - Applications (traffic flow, chemical equations)
- Unit 2: Inverse of a matrix, linear systems and special forms of matrices
 - Inverse of a matrix and properties
 - Linear systems and the inverse
 - Special forms of matrices
 - Applications (economic systems)
- Unit 3: Determinant of a matrix
 - Determinant with minors and cofactors
 - Determinant by row reduction
 - Properties of the determinant
 - Cramer's rule
 - Applications (geometry)
- Unit 4: Euclidean vector spaces in 2-, 3-, and n -dimensions
 - Vector operations and properties
 - Lengths
 - Distances and dot/inner product
 - Orthogonality
 - Vector and parametric equations of lines and planes
 - Cross product
 - Eigenvalues and eigenvectors
 - Applications (dynamical systems, Markov chains)
- Unit 5: General vector spaces
 - Real vector spaces
 - Subspaces
 - Linear independence
 - Basis
 - Dimension
 - Linear transformations
 - Matrix transformations
 - Applications (computer graphics)

2 Readings

Linear Algebra with Applications, W. Keith Nicholson, <https://lyryx.com/linear-algebra-applications/>