MATH 255 Introduction to Linear Algebra

This course focuses on systems of linear equations and matrices, Gauss elimination, matrices, determinants vectors in 2- and 3-dimensional space, norm, dot product, cross product, lines, planes, Euclidean vector spaces, general vector spaces, and matrix diagonalization.
(Pre-requisites: MATH 151 or MATH 153)

Course Learning Outcomes:

By the end of the course, students will be able to:

1. Demonstrate detailed knowledge and understanding of the concepts of linearity, vector spaces and linear transformations.
2. Use linear algebra concepts and theories such as vectors or matrices when organizing and processing data in engineering applications.
3. Solve systems of linear equations by employing a variety of methods and interpret their significance.
4. Use appropriate software to solve linear algebra problems.

Textbook & Course Materials:

Ron Larson, Elementary Linear Algebra, 8th Edition, 2017, Cengage

Course Content:

1. Introduction to Systems of Linear Equations.
2. Gaussian Elimination.
3. Applications of Systems of Linear Equations.
4. Operations with Matrices.
5. Properties of Matrix Operations.
6. The Inverse of a Matrix.
7. The Determinant of a Matrix.
8. Determinants and Elementary Operations.
9. Properties of Determinants.
10. Applications of Determinants.
11. Vectors in Euclidean Space
12. Vector Spaces (briefly)
13. Subspaces of Vector Spaces (briefly)
14. Spanning Sets and Linear Independence.
15. Basis and Dimension.
16. Rank of a Matrix and Systems of Linear Equations.
17. Length and Dot Product in Euclidean Space.
18. Orthonormal Bases: Gram-Schmidt Process.
19. Introduction to Linear Transformations.
20. The Kernel and Range of a Linear Transformation.
21. Matrices for Linear Transformations.
22. Eigenvalues and Eigenvectors.
23. Diagonalization.
24. Symmetric Matrices and Orthogonal Diagonalization.
25. Applications of Eigenvalues and Eigenvectors.