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| **Linear Algebra** | **Module Title:** |
| **MATH 244** | **Module ID:** |
| **MATH 102** | **Prerequisite:** |
| **5** | **Level:** |
| **3 (3+0+1)** | **Credit Hours:** |

**Module Description:**

Matrices and their operations, Types of matrices, Elementary transformations, Linear systems of equations.(homogeneous and non-homogeneous), Solving Linear systems by Kramer,s Rule and Gaus Jordan, Determinants, elementary properties, Inverse of a matrix, Vector spaces, linear independence, finite dimensional spaces, linear subspaces, Inner product spaces, Linear transformations, kernel and image of a linear transformation, Eigen values and Eigen vectors of a matrix and of a linear operator.

**Module Aims:**

* Know the basic operations on matrices.
* Be able to solve systems of homogeneous and non-homogenous linear equations.
* Be able to solve find the inverse of matrix.
* Understanding the concepts of vectors, and vector space.

**Learning Outcomes:**

* Understand the basic concepts of linear algebra, such as matrices and its operations, determinate.
* Identification of linear systems and ways of solving them.
* Understanding the concept of vector space and its related topics such as linear independence, finite dimensional spaces.
* Identify the basis and Dimension and the rank of the matrix, inner product and linear transformation.
* To be able to do matrix operations and compute the deter
* The ability to find the invers of the matrix.
* To identify the linear combination , linear dependent and linear independence
* The development of the student's ability to use these concepts.
* The development of the student's ability to apply the above principles in practical applications.

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| List of Topics | No. of  Weeks | Contact Hours |
| Matrices and their operations. | 2 | 6 |
| Types of matrices | 1 | 3 |
| Elementary transformations | 1 | 3 |
| Linear systems of equations.(homogeneous and non homogeneous). | 1 | 3 |
| Solving Linear systems by Kramer,s Rule and Gaus Jordan. | 1 | 3 |
| Determinants, elementary properties. | 1 | 3 |
| Test1 | 1 | 3 |
| Inverse of a matrix. | 1 | 3 |
| Vector spaces, linear independence. | 1 | 3 |
| finite dimensional spaces. | 1 | 3 |
| linear subspaces.  Test2 | 1 | 3 |
| Inner product spaces. | 1 | 3 |
| Linear transformations, kernel and image of a linear transformation | 1 | 3 |
| Eigen values and Eigen vectors of a matrix and of a linear operator. | 1 | 3 |

**Textbook**:

Elementary Linear Algebra with applications, Howard Anton, Wiley & Sons.Edition: 9th Edition,