# MT-203 Linear Algebra

**Credit Hours 3 (3-0)**

|  |  |
| --- | --- |
| **Program:** BSCS | **Semester:** III |
| **Pre Requisite:** None | **Follow Up:** None |
| **Course Description** The course deals with elementary linear algebra and its applications. This includes: systems of linear equations and matrices, determinants, vector spaces, inner-product spaces, eigenvalues, eigenvectors, diagonalization, linear transformations, and applications.  |
| **Course Objectives**The following are the primary objectives for this course:* To learn the fundamental concepts of linear algebra in the concrete setting of Rn
* To learn to use linear algebra to solve problems from engineering and other fields
* To learn to use computer software to apply the techniques of linear algebra
* To communicate, both orally and in writing, the theoretical concepts and scientific applications
 |
| **Learning Outcomes** Students will be able to :* Effectively express concepts of linear algebra in written form;
* Demonstrate ability to think critically about vector spaces and linear transformations; Locate and use information to solve problems of linear transformations and vector spaces;
 |
| **Textbooks**Linear Algebra& Its Applications by Bernard Kolman |
| **Reference Books / Material*** Linear Algebra by Lipschutz& Marc
* Linear Algebra by Hoffman & Kunge
* Gilbert Strang, Strang, Brett Coonley, Andy Bulman-Fleming, Andrew Bulman-Fleming, Strang's Linear Algebra And Its Applications, 4th edition, Brooks/Cole, 2005
* Howard Anton, Chris Rorres, Elementary Linear Algebra: Applications Version, 9th edition, Wiley, 2005.
* David C. Lay, Linear Algebra and Its Applications, 2nd edition, Addison-Wesley, 2000.
 |
| **Course Distribution** | Theory: 30%Problem Analysis: 20%Solution Design: 45%Social and Ethical Issues: 5% |
| **Marks Distribution** | ***Mid Term*** Test 1: 10 Marks; Test 2: 10 Marks; Assignment: 05 Marks; Quiz: 05 Marks***End Term*** Paper: No Choice, 65 Marks, 03 hours; Attendance: 05 Marks |
| **Technology Involved** (Multimedia, Overhead Projector, Web, etc.) |
| **Practiced Techniques** (Class Room Lecture, Presentation, Workshop, Group Discussion, Survey, etc.) |

**Theory**

|  |  |  |
| --- | --- | --- |
| **Week** | **Topic** | **Learning Activities** (Assignments, Quizzes, Presentations, etc.) |
| 1 | Linear Equations & MatricesSolving linear systems, Matrices, Dot product &Matrix Multiplication |  |
| 2 | Properties of Matrix Operations, Solving linear Systems with matrices, The inverse of a Matrix |  |
| 3 | DeterminantsDefinition & properties, Cofactor Expansion & Applications |  |
| 4 | Vectors in R & R2Vectors in Plane, Properties of vectors |  |
| 5 | Real Vector SpacesSubspaces, Linear Independence and spannig |  |
| 6 | Basis & Dimensions, Homogeneous Systems |  |
| 7 | The Rank and Nullity of a Matrix & Applications |  |
| 8 | Coordinates & Change of Basis |  |
| 9 | Orthonormal Basis, orthogonal basis |  |
| 10 | Orthogonal Complements |  |
| 11 | Eigen Values & Eigen Vectors, eigen values |  |
| 12 | Diagonalization of Matrices |  |
| 13 | Diagonalization of Symmmetric Matrices |  |
| 14 | Linear Transformations |  |
| 15 | The Kernal & Range of Linear Transformation |  |
| 16 | The Matrix of a Linear Transformation |  |