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| **logo University of Management & Technology** School of Science & Technology  |
| MA 210 Linear Algebra |
| **Lecture Schedule** | Consult the time-table. | **Semester** | Fall 2012 |
| **Pre-requisite** | --------- | **Credit Hours** | 3 |
| **Instructor(s)** | Syed Ali Mardan Azmi | **Contact** | 0321-7225203 |
| **Office** |  | **Office Hours** | See office window  |
| **Teaching Assistant** |  | **Contact** |  |
| **Office** |  | **Office Hours** |  |
| **Course Description** | An introduction to the algebra and geometry of vector spaces and matrices, this course stresses important mathematical concepts and tools used in advanced mathematics, Computer Science, Physics and Economics. A systematic method of solving systems of linear equations is the underlying theme and applications of the theory will be emphasized. Topics of exploration include Gaussian elimination, determinants, linear transformations, equations of line and plane and Cylindrical and Spherical co-ordinate system. Conference time will be allocated to clarifying course ideas and exploring additional applications of Linear Algebra. This course directly contributes to **objectives** a, d, e, f and g of the HEC Electrical Engineering Curriculum. |
| **Expected Outcomes** | In accordance with HEC curriculum **outcomes** a, b, d, e, g, h & i, students at the end of the course should be able to* To be able to express a system of equations in matrix form and solve by different methods.
* To be fully familiar with vectors in two and three dimensions and their properties.
* To understand the concept of a vector space and its various models.
* To have a clear notion of a linear transformation and its applications.
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| **Textbook(s)** | **Recommended Text:*** Anton, Howard, *Elementary Linear Algebra,* 10th Edition. Wiley Publishing, 2005.
* Calculus and analytical geometry, Dr. S. M. Yusuf (Latest Edition)

**Reference:**Mathematical Methods, Dr. S. M. Yusuf (Latest Edition) |
| **Grading Policy** | Quizzes (Minimum 4 ) : 15%Assignments (Minimum 4 ) : 10% | Mid Term: 25% Final Term: 50% |

**Course Schedule**

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| **Week** | **1st Lecture** | **2nd Lecture** |
| 1 | Brief Introduction to Matrices, Symmetric and Hermitian Matrices, Introduction to Elementary Row Operations. | Echelon form and reduced Echelon form of a matrix. Rank of a matrix. |
| 2 | System of Linear equations, Gaussian elimination method. Consistency Criterion for Solution of Linear equation. | Gauss-Jordan Method. Application of system of Linear equations. |
| 3 | Inverse of a matrix by using Elementary Row Operations  | Introduction to determinants, Properties of determinants of order n. |
| 4 | Axiomatic definition of a determinant. Applications of Determinants (Crammer’s Rule) | Vector Spaces, Vector subspaces, Linearly combination of vectors. |
| 5 | Linear dependence and basis  | Linear transformations. |
| 6 | Eigen values and eigenvectors. | Co-ordinates of a point dividing a line segment in a given ratio. |
| 7 | Vector form of a straight line, Parametric equations of a straight line | Symmetric form of a straight line |
| 8 | Directions ratios and direction cosines. | **Mid Term Exam** |
| 9 | Angle between two straight lines, | Distance of a point from a line. |
| 10 | Equation of a plane | Angle between two planes, |
| 11 | Intersection of two planes. | Intersection of a plane and a straight line, Skew lines. |
| 12 | Introduction to Cylindrical and Spherical co-ordinates, Quadric Surfaces | Degenerate surfaces, Symmetry of surfaces |
| 13 | Trace and intercepts of surfaces | Surface of revolution. |
| 14 | Cylinder, Right cylinder | The cone |
| 15 | General Equation of Sphere | Great circle |
| **Final Term Exam (Comprehensive)** |