**University of Management and Technology**

**School of Science**

***Department of Mathematics***

**Course Code:** MTH750

**Course Title:** Applied Linear Algebra **Program:** Ph.D.

**Course Outlines**

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| **Schedule** |  | **Pre-requisite** |  |
| **Course Coordinator** | Dr. Muhammad Tanveer Hussain | **Contact** | Ext. 3607  Cell: 03216079982 |
| **Course**  **Description** | In this course, we will discuss the basics of linear algebra and how to analyze different problems from different filed of studies and suggest some optimal solution to the problems. Linear algebra helps students develop facility with visualization, see connections among mathematical areas, and appreciate the power of abstract thinking.  **TOPICS:**  Review of some basics concept of linear algebra  Fundamental Matrix Spaces  Eigen values and eigenvectors, matrix diagonalization  Inner product space  Gram–Schmidt Process; QR-Decomposition  General Linear Transformations, Isomorphism, and matrix of transformation  Singular value decomposition  Constructing curves and surfaces through specified points with linear system  Equation of an orbit in matrix determinants  Maximum and minimum value theorem with applications  Matrix algebra in Graph theoretic applications  Games of strategy  Chaos  Age-specific population growth  Leontief economic models  Hill cipher of a message with linear algebra  We will also discuss maximum possible latest research paper on application of  Linear algebra in real life. | | |
| **Expected**  **Outcomes** | * Able to apply and extend the several theoretical results to real word problems. * Comparative analysis can be made amongst the latest techniques * Able to read, understand and explore research articles about the latest techniques with linear algebra. * Students will be able to see the connections between the abstract topics like vector spaces/subspaces and applied topics like rotation matrices/inner product spaces which will further help them to see the similarities between Linear Algebra and other courses e.g. Cryptography, Graph Theory, Computer Graphics and feel confident to study those courses in the future. | | |
| **Reference books/ research Papers:** | 1. Linear Algebra and its Application, 6th edition by David C.L., Steven R.L., Judi J.M. 2. Introduction to Linear Algebra, 4th edition by Gilbert Strang. 3. Elementary Linear Algebra, Applications Version, 12th Edition by Howard Anton and Chris Rorres. 4. Linear Algebra with Applications, 2018 by W. Keith Nicholson   **We will also discuss maximum possible latest research paper on application of linear algebra in real life.** | | |
| **Quiz/assign-ments** |  | **Project** | Project from advanced topics and/or research papers |
| **Presentation** | Research paper from group of students | **Midterm**  **Examination** | 1 midterm Examination |
| **Final**  **Examination** | 1 final Examination |
| **Attendance**  **Policy** | According to university policy | | |
|  | **Grading Policy** | | |
| **Quiz/assign-ments** |  | **Midterm Examination** |  |
| **Presentation/Project** |  | **Final**  **Examination** |  |