**University of Management and Technology**

**School of Science**

***Department of Mathematics***

**Course Code:** MTH750

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

**Course Outlines**

|  |  |  |  |
| --- | --- | --- | --- |
| **Schedule**  |  | **Pre-requisite** |  |
| **Course Coordinator** |  Dr. Muhammad Tanveer Hussain | **Contact** | Ext. 3607Cell: 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 algebraFundamental Matrix SpacesEigen values and eigenvectors, matrix diagonalizationInner product spaceGram–Schmidt Process; QR-DecompositionGeneral Linear Transformations, Isomorphism, and matrix of transformationSingular value decompositionConstructing curves and surfaces through specified points with linear systemEquation of an orbit in matrix determinantsMaximum and minimum value theorem with applicationsMatrix algebra in Graph theoretic applicationsGames of strategyChaosAge-specific population growthLeontief economic modelsHill cipher of a message with linear algebraWe 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** |  |