Course Name	Linear Algebra (for computer science)
References	1. Strang, Gilbert. Introduction to Linear Algebra, Wellesley-Cambridge Press, 2016 2. Deisenroth, Marc Peter, A. Aldo Faisal, and Cheng Soon Ong. Mathematics for machine learning. Cambridge University Press, 2020. 3. Strang, Gilbert. Linear algebra and learning from data. Cambridge: Wellesley-Cambridge Press, 2019. 4. Goodfellow, Ian, Yoshua Bengio, Aaron Courville, and Yoshua Bengio. Deep learning. Vol. 1, no. 2. Cambridge: MIT press, 2016.
Course instructor	Dr. Behrooz Nasihatkon
Syllabus	1. Introduction, Logistics, Applications 2. Data, Vectors, Matrices, 3. Matrix operations, Identity matrix, symmetric matrices, matrix multiplication, matrix transpose, 4. Systems of linear equations 5. Row-echelon form, Gaussian elimination, 6. Vector spaces, 7. Linear Independence, basis and rank 8. Linear subspaces 9. Matrix rank 10. Linear maps 11. Image, Kernel, row space, column space, null space 12. Affine subspace, affine maps 13. Inner product, norms 14. positive-definiteness 15. vector lengths, orthogonality, 16. Orthogonal matrices, orthonormal basis 17. Projection matrix, Orthogonal projection, 18. Rotations, Euclidean transformations, 19. Determinant 20. Eigenvalues end Eigenvectors, Eignespaces 21. Cholesky decomposition, 22. Eigen-decomposition 23. Singular Value Decomposition 24. Matrix approximation 25. Data, models and learning 26. Introduction to Machine Learning

	27. Loss functions, model fitting 28. Least Squares, 29. Multivariate Calculus, Gradients, 30. the Hessian Matrix 31. Linearization, 32. Optimization, Gradient Descent 33. Convex optimization 34. Principle component analysis, dimensionality reduction 35. Manifold Learning