

**Linear Algebra:**

Matrix and vector algebra, systems of linear equations using matrices, linear independence, Matrix factorization concept/LU decomposition, Eigen values and eigenvectors.

**Understanding of calculus:**

Concept of function and derivative, Multivariate calculus: concept, Partial Derivatives, chain rule, the Jacobian and the Hessian.

**1. Linear Algebra:****1.1 Matrix and vector algebra**

- Introduction to Matrices: <https://www.youtube.com/watch?v=yRwQ7A6jVLk>
- Matrices (Full Basics): <https://www.youtube.com/watch?v=6qYj1PwP6U4>

**1.2 System of linear equations using matrices: <https://www.youtube.com/watch?v=hagIiYC1JiM>****1.3 Linear independence: [https://www.youtube.com/watch?v=9WjuLvPT\\_2A](https://www.youtube.com/watch?v=9WjuLvPT_2A)****1.4 Matrix factorization: <https://www.youtube.com/watch?v=wTUSz-HSaBg>****1.5 LU decomposition: <https://www.youtube.com/watch?v=dwu2A3-ITGU>**

<https://www.youtube.com/watch?v=NtSgdU32K6g>

**1.6 Eigen values and eigenvectors: [https://www.youtube.com/watch?v=h8sg\\_XBp6VA](https://www.youtube.com/watch?v=h8sg_XBp6VA)****2. Understanding of calculus:****2.1 Concept of function and derivative:**

<https://www.youtube.com/watch?v=lowavG2SXsQ&t=219s>

<https://www.youtube.com/watch?v=kvGsIo1TmsM>

<https://www.youtube.com/watch?v=N2PpRnFqnqY>

**2.2 Multivariate calculus: concept: <https://www.youtube.com/watch?v=TrcCbdWwCBc>**

Example: <https://www.youtube.com/watch?v=iBgOoaeLUcM>

**2.3 Partial Derivatives: <https://www.youtube.com/watch?v=AXqhWeUEtQU>****2.4 Chain rule: <https://www.youtube.com/watch?v=NO3AqAaAE6o>****2.5 The Jacobian matrix: <https://www.youtube.com/watch?v=bohL918kXQk>****2.6 The Hessian matrix: <https://www.youtube.com/watch?v=LbBcuZukCAw>**

**Online Courses Available:**

<https://www.coursera.org/specializations/mathematics-machine-learning>

<https://www.coursera.org/specializations/mathematics-for-data-science>

<https://www.udemy.com/course/machine-learning-2020-complete-maths-for-machine-learning>

**Other Link:**

Linear Algebra for Beginners | Linear algebra for machine learning:

<https://www.youtube.com/watch?v=kZwSqZuBMGg&t=73s>

Case Study:**1. How does Netflix recommend movies? Matrix Factorization:**

A friendly introduction to recommender systems with matrix factorization and how it's used to recommend movies in Netflix.

<https://www.youtube.com/watch?v=ZspR5PZemcs>

**2. The Applications of Matrices:**

This video goes over just a few applications of matrices that may give you some insight into how they can be used in the real world.

<https://www.youtube.com/watch?v=rowWM-MijXU>