Linear algebra

An introduction to matrix algebra
These slides provide a quick introduction to matrices. They might be useful if you're encountering matrices for the first time and want to start working with them immediately.

- For help with some terminology associated with matrices: row, column matrices and their entries, identity, square and zero matrices, and the transpose of a matrix.
  Introduction to matrices (pdf, 195KB)
- For help with matrix arithmetic such as adding and subtracting matrices $A \pm B$, multiplying them by scalars cA, and associated properties.
  Addition, subtraction and scalar multiplication (pdf, 178KB)
- For help with multiplying two matrices $A \times B$, and the properties of matrix multiplication.
  Matrix multiplication (pdf, 304KB)
- For an introduction to solving systems of linear equations using matrices: the augmented matrix and elementary row operations.
  Elementary row operations (pdf, 72KB)
- For a worked example of Gaussian elimination: using elementary row operations to reduce matrix to row echelon form, and solving the system by back substitution.
  Using elementary row operations to solve a system of equations (pdf, 202KB)
- An overview of the inverse A^{-1} of a matrix, and how to find the inverse of a 2×2 matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$.
  The inverse matrix (pdf, 80KB)
- Using Gaussian elimination to find the inverse of an $n \times n$ matrix: a worked example of a 3×3 case.
  Finding the inverse of a matrix (pdf, 84KB)
- Using the inverse of a matrix to solve a system of linear equations.
  Solving systems of linear equations using the inverse (pdf, 70 KB)
- For an introduction to determinants and finding the determinant of a matrix using row or column expansions.
  Determinants (pdf, 82KB)
- For some useful properties of determinants such as their relationships with elementary row operations, the determinants of a triangular matrices, and of a product $\det(AB)$.
  Properties of determinants (pdf, 82KB)
- For a taste of how matrix algebra can be applied to linear regression and ordinary least squares estimates.
  Using matrix algebra in linear regression (pdf, 83KB)

Audiovisual recordings
Entire playlist: **Linear algebra recordings (YouTube video)**

Individual videos:
- For help with interpreting and finding the vector equation of a line $\vec{r} = \vec{p_0} + t\vec{v}$.
  Vector equation of a line