

COURSE NAME	Review Course in Maths and Statistics: Calculus and Linear Algebra
COURSE OUTLINE	Part 1: Linear Algebra
	1. Vectors and matrices
	a. Vector spaces
	b. Subspaces
	c. Linear transformations
	d. Matrices and matrix operations
	2. Determinants
	a. Basic rules
	b. Inverse of a matrix
	c. Cramer's rule
	3. Eigen values, eigen vectors
	a. Characteristic equation
	b. Diagonalization of a matrix
	c. Rank and trace of a matrix
	d. Spectral theorem
	e. Quadratic forms
	Part 2: Analysis
	1. Basics
	a. Limits
	b. Continuity
	c. Differentiation, Taylor's formula
	d. Integration
	2. Functions of several variables
	a. Partial derivatives
	b. Tangent planes
	c. Implicit defined functions
	d. Homogenous functions

e. Implicit function theorem



## 3. Optimization

- a. Unconstrained maximization
- b. Convex and concave functions
- c. The Lagrange multiplier method
- d. The Kuhn-Tucker conditions
- 4. Differential equations
  - a. First-order differential equations
  - b. Separable equations
  - c. Linear differential equations