

Week	Date	Material	Reference
1	25-Feb-13	1. Approximation of Numbers on Computer. Errors. Round-off error. Truncation error. Propagation of errors. Representation of functions. Catastrophic cancellation.	K 19.1
2	4-Mar-13	2. Rootfinding: $f(x) = 0$. Bracketing methods The bisection method. The "regula falsi" method. Fixed-point iteration - convergence.	K 19.2 K 19.2
3	12-Mar-13	The Newton-Raphson method. Convergence. The secant method. 3. Solution of Matrix Equations $Ax = b$. Gaussian elimination.	K 19.2 K 7.2, K 7.3
4	18-Mar-13	Gaussian Elimination - Numerical implementation. Storing multipliers - LU decomposition of a matrix. Determinants. Pivoting strategies - PLU decomposition.	K 20.1 K 20.2 K 20.2
5	25-Mar-13	Iterative solution of linear equations - Jacobi and Gauss-Seidel. Convergence of iterative methods. Norms, matrix norms. EASTER BREAK	K 20.3 K 20.3, K 20.4
5	4-Apr-13	Ill-conditioned systems. The condition number of a matrix.	K 20.4
6	8-Apr-13	Newton's method for many equations. 4. The Matrix Eigenvalue Problem. Introduction to eigenvalues. Gershgorin's circle theorem. The power method.	K 8.1, K 8.2, K 20.6 K 20.7, K 20.8
7	15-Apr-13	Similar matrices have the same eigenvalues. Orthogonal matrices. Householder transformation to tri-diagonal form. The QR algorithm.	K 8.3, K 20.6 K 20.9 K 20.9
8	22-Apr-13	5. Interpolation. Polynomial interpolation. Lagrange interpolation.	K 19.3 K 19.3
9	29-Apr-13	Newton polynomial and divided differences. Equally-spaced points - errors - Runge's example. Cubic-spline interpolation.	K 19.3 K 19.4
10	6-May-13	Constructing the cubic spline. End conditions. Properties of the cubic spline. 6. Numerical integration and Differentiation. Trapezoidal rule.	K 19.4 K 19.5
11	13-May-13	Simpson's rule. Errors. Newton-Cotes rules. Gaussian quadrature.	K 19.5 K 19.5
12	20-May-13	Numerical differentiation. 7. Numerical Solution of ODEs. Introduction. Euler's method. Local and global truncation error.	K 19.5 K 21.1
13	27-May-13	Heun's method. Taylor-series methods. Introduction to Runge-Kutta methods for ODEs. Solving systems of first-order ODEs.	K 21.1