

**School of Mathematics****Course 261 — Numerical Analysis**  
( )

2000-01

**Lecturer:** Dr. Sinéad Ryan**Requirements/prerequisites:** None**Duration:** 24 Weeks**Number of lectures per week:** 3**Assessment:** Examination and Homework assignments**End-of-year Examination:** One 3-hour examination; counts 90%; homework counts 10%**Description:**

Numerical Linear Algebra: Gaussian elimination and Gauss-Jordan elimination; LU decomposition; Condition number of a matrix; SVD and sparse matrix methods; Stability and error analysis; Iterative solutions and convergence including Krylov subspace techniques.

Numerical Integration: Integration of functions, ODEs and PDEs; Introduction to path integrals.

Integral Equations and Inverse Theory: Fredholm and Volterra equations; Integral equations and singular kernels; Inverse problems and a priori information.

Evaluation of Functions: Series and convergence; Polynomial and rational functions; Chebyshev and Padé approximations.

Interpolation and Extrapolation: Polynomial and rational interpolation and extrapolation; Cubic spline interpolation; Interpolating in more than two dimensions. The point-wise error in Lagrange interpolation.

Statistical description and Modeling of Data: Moments of a distribution - mean, variance etc; Comparing two distributions; Correlations in datasets; Fitting data to a straight line; Fitting data with errors in x and y coordinates; Bootstrapping and Monte Carlo Methods.

October 12, 2000