

Course: MATH 3P60 (NUMERICAL METHODS)
Instructor: J. Vrbik
Office: J410
Phone: 688-5550 local 3298
E-mail: jvr bik@brocku.ca
Web site: spartan.ac.brocku.ca/~jvr bik

Topics to be covered

Newton and Lagrange interpolations.

Least-square fit (both discrete and continuous), weights, Gram-Schmidt process and orthogonal polynomials (Legendre, Chebyshev and Laguerre).

Trigonometric polynomial approximation, fast Fourier transform.

Numerical integration: trapezoid and Simpson rules, Romberg algorithm. Designing formulas for Gaussian integration.

Numerical differentiation, Richardson extrapolation.

Linear system of equations, Gaussian elimination with scaled pivoting, matrix inverse, LU factorization, tridiagonal systems.

Newton's method for solving nonlinear equations, extended to two and more unknowns.

Boundary-value problems for second-order differential equations, finite-difference technique.

Initial-value problems for first-order (sets) of differential equations, Runge-Kutta method.

Eigenvalues and eigenvectors of square matrices. Householder's method and the QL algorithm.

Marking Scheme: Assignments (about 10) - 30%
Two Midterms - 15% each
Final Exam - 40%

**Recommended textbook: R L Burden, J D Faires NUMERICAL ANALYSIS
Eighth Edition**