Syllabus
Computational Math - Qualifying Exam

Topics:

- Approximation of functions by algebraic polynomials, splines, and trigonometric polynomials
- Numerical differentiation and integration
- Orthogonal polynomials and Gaussian quadrature
- Numerical solution of nonlinear systems, unconstrained optimization
- Discrete Fourier transform
- QR factorization and least square problems
- Conditioning and stability
- Solving systems of equations
- Eigenvalue/eigenvector problems
- Krylov subspace iterative methods
- Singular value decomposition (SVD)
- Conjugate gradient methods

Reference texts:

- *An Introduction to Numerical Analysis*, by Endre Suli and David F. Mayers, Cambridge University Press, 2003.
- *Numerical Mathematics*, by Alfio Quarteroni, Riccardo Sacco and Fausto Saleri, Springer, 2000.
- *Concise Numerical Mathematics*, by Robert Plato, AMS, 2003.
- *Numerical Linear Algebra*, by Lloyd Trefethen and David Bau III, SIAM, 1997.
- *Applied Numerical Linear Algebra*, by James Demmel, SIAM, 1997.
- *Matrix Computations*, by Gene H. Golub and Charles F van Loan. The john Hopkins University Press, 1988.
- *Matrix Analysis*, by Roger A. Horn and Charles R. Johnson, Cambridge University Press, 1985.
- *Iterative Methods for Linear and Nonlinear Equations*, by C.T. Kelley, SIAM, 1995.