

328 Suggested Class Schedule

A First Course in Numerical Methods by Uri M. Ascher and Chen Greif, SIAM 2011.

Class	Topic(s)	Sections
1	Numerical Algorithms	Chapter 1
2	The essentials, Floating point systems	2.1, 2.2
3	Roundoff error accumulation, IEEE standard	2.3, 2.4
4	Solving nonlinear equations, Bisection method	3.1, 3.2
5	Fixed point iteration, Newton's method	3.3, 3.4
6	Linear Algebra Background	Chapter 4
7	Gaussian elimination and back sub, LU decomposition	5.1, 5.2
8	Pivoting strategies, The Cholesky decomposition	5.3, 5.5
9	Estimating errors and the condition number	5.8
10	Exam 1	
11	Least squares and the normal equations, QR	6.1, 6.2
12	Householder transformations, Gram-Schmidt	6.3
13	The need for iteration, Stationary iteration and relaxation	7.1, 7.2
14	Convergence of stationary methods, Conjugate gradient	7.3, 7.4
15	The power method and variants, SVD	8.1, 8.2
16	General methods to compute eigenvalues and singular values	8.3
17	Newton's method for nonlinear systems	9.1
18	General approximation and interpolation, Monomial interpolation	10.1, 10.2
19	Lagrange interpolation, Divided differences	10.3, 10.4
20	Exam 2	
21	The error in polynomial interpolation	10.5
22	Deriving formulas using Taylor series, Richardson extrapolation	14.1, 14.2
23	Roundoff and data errors in numerical differentiation	14.4
24	Basic quadrature, Composite numerical integration	15.1, 15.2
25	Romberg integration	15.5
26	Initial value ODE, Euler's method	16.1, 16.2
27	Runge Kutta methods	16.3
28	Review	