

There are 24 lectures, 2 exams, and 2 project presentation classes scheduled.

0. (1 lecture)
 - Rules
 - Matlab
 - Cache

1. Floating point and errors (2 lectures)
 - IEEE
 - Organization
 - Important numbers
 - Errors

2. Vectors and Matrices (2 lectures)
 - Manipulating vectors and matrices
 - Matrix vector product
 - Cost
 - Cache
 - BLAS
 - Basis, Range, Domain
 - Orthogonality, Gram Schmidt
 - Matrix matrix product
 - Order of operations

3. Linear systems (2 lectures)
 - LU decomposition
 - Errors

4. Least Squares (2 lectures)
 - Norms
 - QR
 - Householder
 - Givens

5. Eigen-value decomposition (3 lectures)
 - Eigen values and eigen vectors
 - SVD
 - Well Posedness
 - PCA and reduced rank-approximation

6. Ordinary Differential Equations (5 lectures)
 - Numerical Solution of Initial Value Problems
 - Differential Algebraic equations
 - Boundary value problems

7. Optimization (5 lectures)
 - Unconstrained optimization
 - Newton and Secant Methods in 1-D
 - Simplex method (Nelder-Mead)
 - Multi-dimensional methods
 - Newton methods
 - Conjugate gradients
 - Line searches
 - Constrained optimization
 - Barrier methods
 - Reduced variable methods
 - Simulated Annealing
 - Metropolis Algorithm

8. Nonlinear Systems and Continuation (1 Lecture)
 - Newton Like methods
 - Homotopy methods

9. Monte Carlo Methods (3 lectures)
 - Basic Statistics: mean variance, central limit theorem
 - Monte-Carlo simulation
 - Integration
 - Importance sampling

Lecture numbers and topics to be covered are approximate, and only provided for guidance ...