

Prerequisite	(Math 101 or Math 131) and (Math 201 or Math 221)
Lectures	MMTTWW 787878
Instructor	Fatih Ecevit Office TB 210B Office Hours ... by appointment E-mail fatih.ecevit@bogazici.edu.tr
Text	Kincaid & Cheney: <i>Numerical Analysis: Mathematics of Scientific Computing</i> AMS, 3rd Revised Ed. (2010), ISBN: 978-0821847886
Recommended Text	Burden & Faires: <i>Numerical Analysis</i> Brooks/Cole, 8th Ed. (2005), ISBN: 978-0534404994
References	Allaire & Kaber: <i>Numerical Linear Algebra</i> , Springer, 2007. Atkinson: <i>An Introduction to Numerical Analysis</i> , Wiley, 1989. Bradie: <i>A Friendly Introduction to Numerical Analysis</i> , Prentice Hall, 2006. Davis & Rabinowitz: <i>Methods of Numerical Integration</i> , Academic Press, 1984. Gautschi: <i>Numerical Analysis: An Introduction</i> , Birkhauser, 1997. Greenbaum: <i>Iterative Methods for Solving Linear Systems</i> , SIAM, 1997. Golub & Van Loan: <i>Matrix Computations</i> , Johns Hopkins, 1996. Isaacson & Keller: <i>Analysis of Numerical Methods</i> , Dover, 1994. Kress: <i>Numerical Analysis</i> , Springer, 1998. Quarteroni, Sacco & Saleri: <i>Numerical Mathematics</i> , Springer, 2000. Stoer & Bulirsch: <i>Introduction to Numerical Analysis</i> , Springer, 2002. Saad: <i>Iterative Methods for Sparse Linear Systems</i> , SIAM, 2003. Trefethen & Bau: <i>Numerical Linear Algebra</i> , SIAM, 1997.
Rules	<ul style="list-style-type: none"> • One midterm exam (40%): Thursday, July 23 at 18:45 [This date/hour will NOT be changed] • One final exam (60%): Date to be determine by the registration office. • No makeup exam: [You fail the course if you miss ONE of the exams for any reason.] • No E-exam. • You are responsible for the announcements made in CLASS and also the course MOODLE page.
Lecture notes	• Lecture notes will be provided.
Problem sets	• There will be occasional problem sets. Solutions will be posted in a few days.

TENTATIVE COURSE OUTLINE

Mathematical Preliminaries:

Review of Calculus and Orders of Convergence

Solutions of Equations in One Variable:

The Bisection Method, Fixed-Point Iteration, Newton's Method, Secant Method, Regula Falsi Method, Aitken's Δ^2 Method, Steffensen's Method

Direct Methods for Solving Linear Systems:

Gaussian Elimination, Pivoting Strategies, LU Factorization, Cholesky Factorization, Crout Factorization

Iterative Methods for Solving Linear Systems:

Norms of Vectors and Matrices, Spectrum and Spectral Radius, Jacobi Iteration, Gauss-Seidel Iteration, SOR Iteration

Projection Methods for Solving Linear Systems:

Steepest Descent Method, Conjugate Gradient Method, GMRES

Matrix Eigenvalue Problem:

The Power and Deflation Methods, Householder's Method, The QR Algorithm

Interpolation and Polynomial Approximation:

Lagrange's Interpolating Polynomials, Newton's Divided Difference Formulas, Hermite Interpolation, Cubic Splines, Least Squares Approximation, Chebyshev Polynomials, Trigonometric Polynomials, Fast Fourier Transform

Numerical Differentiation and Integration:

Numerical Differentiation, Richardson's Extrapolation, Interpolatory Quadrature, Gaussian Quadrature