CS 323: Numerical Analysis and Computing
Section 1 Spring 2008

Instructor: Bahman Kalantari (kalantari@cs.rutgers.edu), Hill 444, Tel: 445-3542.
Course Web Page: http://www.cs.rutgers.edu/~kalantar/323
Office Hours: M 2-4.
Lectures: M,W 5:00-6:20), SEC-118
Recitations: W 3:35-4.30 PM, SEC-216
Teaching Assistant: Darakhshan J. Mir (mir@cs.Rutgers.EDU), Hill 412, Tel:732-445-2001(ext 9536).
Office Hours: Th 12:00-2:00.
Credits: 4.
Prerequisites: CALC1, CALC2, math 250 (linear algebra). Students are expected to be able to program in a high level programming language.
Grading: Midterm (35%); Final (45 %), Pop Quizzes (6-8) + Written Homework (5-6)+ Computer Programs (2-3) (20-25 %).
Exam Dates: Midterm: March 10, regular period in class; Final: May 9 , 4:00-7:00 pm.
Course Policy:
All exams are closed book and notes, but you are allowed to bring in one regular sheet of paper containing whatever formulas or information you desire.
All pop quizzes are closed book. Lowest grade pop quiz is dropped.
All homework and programming assignments are due in class. Late assignments are not accepted. Assignments are to help you understand the material. They will be graded as a way to help you understand what you did right and wrong. However, they will count towards your final grade as pass/fail. If you receive over 50% of the points for an assignment, it will be counted as full credit for that assignment. Otherwise, 0 points.
All programming assignments must be written in MATLAB. MATLAB includes significant online documentation, and additional instruction will take place in recitation. You may discuss assignments with other students at a general level, but all homework solutions and all program coding, debugging, and testing should be entirely your own work. All violations of the student code of conduct will be vigorously prosecuted.
Objective: Derivation, Analysis, and Implementation of Basic Algorithms for Generic Numerical Problems
Course outline:
• Taylor polynomials, Floating Point numbers and roundoff error (Chapters 1,2)

• Solution of nonlinear equations (Chapter 3) bisection method, fixed point iteration, Newton’s method, linear and quadratic convergence, roots of polynomials

• Linear algebraic systems (Chapter 6) Gaussian elimination, partial pivoting, matrix inversion, LU decomposition, error analysis

• Least squares approximation (Chapter 7) straight line approximation, general linear case

• Polynomial interpolation (Chapter 4) Lagrange and Newton forms of interpolating polynomial, error term, piecewise polynomial interpolation, interpolation of derivatives, splines

• Numerical integration and differentiation (Chapter 5) derivation of quadrature formulas and their error terms, composite formulas, adaptive integration, Gaussian quadrature

• Numerical solution of ODE’s (Chapter 8) introduction to ordinary differential equations, basic numerical methods, e.g., Euler’s method.