



AMAT 314 Numerical Methods – Spring 2009

Subject Code: AMAT 314

Number of periods per week: 3

Number of total weeks: 13

Office: Room 203, New Building

Office Hours: Monday 14:00-15:00, Tuesday 13:00-14:00, Thursday 13:00-15:00

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Course Outline

- Review on Linear Algebra. Matrices, Inverse Matrix, Gauss Elimination, eigenvalues and eigenvectors, Cramer's Rule.
- Solving Nonlinear Equations: Method of halving the interval, Newton's method, secant method, general considerations of the $x=g(x)$ methods.
- Curve fitting: Interpolating polynomials, General linear least squares approximation, Fourier series and their convergence.
- Numerical Integration & Differentiation: Trapezoidal rule, Simpson's rule, Romberg integration. Gaussian quadratures.
- Numerical Solution of Ordinary Differential Equations: Initial Value Problems, Single and multiple step problems, convergence and stability.
- Boundary Value Problems, Shooting methods, Finite Difference methods using simple routines.
- Further Topics: Random numbers, Sorting, Minimization/Maximization of functions, Statistical Methods.

Assessment:

- Final exam 50%
- Coursework 50%
 - Midterm 1: 24/3/09 40 % of the coursework marking
 - Midterm 2: 5/5/09 40 % of the coursework marking
 - Computer assignments: 20 % of the coursework marking

Note: The passing mark is 50%.

Textbook:

- J.D. Hoffman, "Numerical Methods for Engineers and Scientists", McGraw Hill Book Co., 1993.
- Singiresu S. Rao, "Applied Numerical Methods for Engineers and Scientists", Prentice Hall, 2002.

References:

- Erwin Kreyszig, "Advanced Engineering Mathematics", 4th Edition, John Willey & Sons.
- George Lindfield and John Penny "Numerical Methods Using Matlab", Prentice Hall, 1999.
- Steven Chapra, "Numerical Methods for Engineers: With Software and Programming Applications", McGraw-Hill, 2001.
- Biran and Breiner, "MATLAB 6 for Engineers", Prentice Hall, 3rd edition, 2002.