

AMATH 3132: Numerical Analysis I

CONTACT INFORMATION

Professor: Dr. J. Alam

Office: HH-3035

Phone: 737-8071

email: alamj@mun.ca

<http://www.math.mun.ca/~alamj/amath3132.shtml>

MEETING

The class will meet MWF from 15:00 to 15:50 in HH-3017.

OFFICE HOUR

M,W: 09:00-11:00 in HH-3035 or by appointment. Students may drop by my office any time between 09:00 and 17:00. An appointment is required ONLY to check if I have other scheduled tasks outside designated office hours.

COURSE OUTLINE

This course will discuss both theoretical and practical aspects of numerical methods, such as approximate solution of algebraic equations, interpolation, curve fitting, integration, and differentiation. Such techniques are the core of Numerical Analysis. We will review the relevant mathematical background and will show how it can be used to construct practical algorithms. Actual implementation of these algorithms will be addressed using MATLAB.

- **Introduction to numerical methods using Matlab**

Programming with Matlab, Numerical error and computer arithmetic, Convergence and efficiency, Norms and condition number, Linear dependence.

- **Solution of algebraic equations (ch.2)**

Solution of linear system, Direct and iterative methods, Convergence of iterative methods, Iterative methods for nonlinear equations, Solution of nonlinear systems.

- **Interpolation and curve fitting (ch.3)**

Interpolating polynomials, Divided difference, Splines and B-splines, Bezier curves, Least-square approximation, Fourier series and fast fourier transform, Chebyshev polynomials.

● **Numerical differentiation and integration (ch.5)**

Finite difference approximation of derivatives, Error in finite difference approximations, Trapezoidal rule, Simpson’s rule, Adaptive integration, Gaussian quadrature.

PREREQUISITE

Prerequisite A designated technical writing course (AM 2130 is recommended) and AM/PM 3260. NOTE: Credit cannot be obtained for both AM 3132 and CS 3731.

TEXT BOOK

Most students may find lecture notes are sufficient. However, I strongly recommend to use at least one of the following text books.

Main text book: Applied Numerical Analysis (7th Ed.) by Gerald, C. F. and Wheatley, P. O.

Secondary text book: Numerical Analysis (8th Ed.) by Burden, R. L. and Faires, J. D.

Calendar description

Introduction to numerical analysis, round-off error, iterative methods for nonlinear equations in one variable, interpolation and polynomial approximation, discrete least-squares approximation, numerical differentiation and integration.

MARKING SCHEME

The best of:

Assignment	30%	Assignment	30%
Mid term examination	20%	Mid term examination	10%
Final examination	50%	Final examination	60%

ASSIGNMENTS

There will be 6 assignments, which must be dropped into the assignment **box for math3132**. Best 5 assignments will be used towards the final grade. Late assignments will not be considered. If the University is closed for the entire day on a due date because of weather, the date will automatically be extended by 12:00(noon) of the following working day. Medical reasons or travel interruptions will NOT be accepted to extend due date. Inability to submit an assignment in time because of reasons other than weather will be assessed case by case.

Assignment #1 due on Jan, 25th, 2010 by 24:00
Assignment #2 due on Feb, 1st, 2010 by 24:00
Assignment #3 due on Feb, 15th, 2010 by 24:00
Assignment #4 due on Mar, 8th, 2010 by 24:00
Assignment #5 due on Mar, 22nd, 2010 by 24:00
Assignment #6 due on Apr, 5th, 2010 by 24:00

MID TERM EXAMINATION

Wednesday, February 17, 2010.

FINAL EXAMINATION

At most 30% of the 2.5 hour final examination will cover pre-mid term materials. The format of the final examination is similar to that of the mid term examination. There are no sample examinations. Lecture notes, assignments, and mid term should adequately guide students for the final examination. The date of the final examination is administered by the register's office.