

AMATH 3132: Numerical analysis I

Jahrul Alam



Winter 2010

AMATH 3132: General description

Time table:

- ▶ **Meeting time:** M, W, F **15:00-15:50** in HH3017.
- ▶ **Office hours** (M) W **09:00-11:00** in HH3035.

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Contact:

- ▶ **Office:** **HH3035**
- ▶ **Phone** 737 8071
- ▶ **email** alamj@mun.ca
- ▶ **web** <http://www.math.mun.ca/~alamj/amath3132.shtml>

Course outline

- ▶ Introduction to numerical methods
- ▶ Solution of linear equations
- ▶ Solution of nonlinear equations
- ▶ Interpolation and curve fitting
- ▶ Numerical differentiation and integration

Course outline

- ▶ Introduction to numerical methods
 1. Programming with Matlab.
 2. Kinds of error and computer arithmetic.
 3. Numerical algorithms.
 4. Convergence and efficiency.
- ▶ Solution of linear equations
- ▶ Solution of nonlinear equations
- ▶ Interpolation and curve fitting
- ▶ Numerical differentiation and integration

Course outline

- ▶ Introduction to numerical methods
- ▶ Solution of linear equations
 1. Linear system and matrices.
 2. Direct method.
 3. Iterative method.
 4. Convergence.
- ▶ Solution of nonlinear equations
- ▶ Interpolation and curve fitting
- ▶ Numerical differentiation and integration

Course outline

- ▶ Introduction to numerical methods
- ▶ Solution of linear equations
- ▶ Solution of nonlinear equations
 1. Bisection method.
 2. Secant and false position method.
 3. Newton's method.
 4. Fixed point iteration.
 5. Nonlinear system.
 6. Line search method.
- ▶ Interpolation and curve fitting
- ▶ Numerical differentiation and integration

Course outline

- ▶ Introduction to numerical methods
- ▶ Solution of linear equations
- ▶ Solution of nonlinear equations
- ▶ Interpolation and curve fitting
 1. Interpolating polynomials.
 2. Divided difference.
 3. Splines and B-splines.
 4. Bezier curves.
 5. Least-square approximation.
 6. Fourier series and fast fourier transform.
 7. Chebyshev polynomials.
- ▶ Numerical differentiation and integration

Course outline

- ▶ Introduction to numerical methods
- ▶ Solution of linear equations
- ▶ Solution of nonlinear equations
- ▶ Interpolation and curve fitting
- ▶ Numerical differentiation and integration
 1. Finite difference method.
 2. Trapezoidal rule.
 3. Simpson's rule.
 4. Adaptive integration.
 5. Gaussian quadrature.

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Text book:

- ▶ **Main text:** Applied Numerical Analysis (7th Ed.) by Gerald, C. F. and Wheatley, P. O.
- ▶ **Secondary text:** Numerical Analysis (8th Ed.) by Burden, R. L. and Faires, J. D.
- ▶ **Software:** Matlab

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Assignments:

- ▶ There are 6 assignments.
- ▶ Download assignment from the website.
- ▶ Need to write code using Matlab.
- ▶ Send your code using the **submit assignment** utility.
- ▶ Hand in your assignment in the drop box.

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Grading scheme:

The best of

- ▶ Assignment(30%)+Mid term(20%)+Final(50%)
- ▶ Assignment(30%)+Mid term(10%)+Final(60%)

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Examinations:

- ▶ Mid term test is on **Wednesday, Feb 17, 2010**.
- ▶ No programming work.
- ▶ The final exam will spread for **2.5** hours.

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▶ web page:

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

