

CPE 310: NUMERICAL ANALYSIS FOR ENGINEERS
Spring 2017

Instructor: Ahmed Tamrawi	Time - 1: MW 9:30 – 11:00
Email: atamrawi@yu.edu.jo	Time - 5: SuTTh 13:00 – 14:00
	Places: Hijjawi Bldg. Hall 401, 200

Course Site: <http://elearning.yu.edu.jo>

Office Hours & Questions: After class, by appointment, or simply send me an email. (Please include CPE-310 in the subject line of your emails to me)

Textbook: We will follow the textbook from C.F. Gerald and P.O. Wheatley’s “*Applied Numerical Analysis*” 5th Edition.

Course Overview: Numerical analysis is a way to do higher mathematics problems on a computer, a technique widely used by scientists and engineers to solve their problems. Numerical analysis involves the study of methods for computing numerical data and solving mathematical and engineering problems like: Solving nonlinear equations, Sets of equations, Interpolation and curve fitting, Numerical differentiation and integration and Finite difference techniques and Numerical solution of ordinary differential equations.

Evaluation Form is available on the website for your to assist how easy it was for you to comprehend the presented material and if you have any feedback good or bad towards enhancing the experience and learning in next lectures.

Assignments: There will be 4 to 5 assignments. Assignments will set the par for exams as exams expected to have the same nature as assignments.

Exams: There will be three exams during the semester:

- **Exam 1** (March 11th, 2017 at 11:00 A.M.)
- **Exam 2** (April 15th, 2017 at 11:00 A.M.)
- **Final Exam**, (TBD)

Exams are closed books. Students who did not attend the first/second exam due to exceptional situations (for e.g., medical emergency) will be given a makeup exam

Plagiarism Student caught cheating will be awarded a 0 in the exam and may be subject to university disciplinary actions.

Grading: The grading breakup will be tentatively as follows:

Assignments & Quizes	10%
Exam #1	20%
Exam #2	20%
Final Exam	50%

Tentative Course Outline:

- Chapter 0: Numerical Computing and Computers**
- 0.1 Introduction
- 0.2 Using a Computer to Do Numerical Analysis
- 0.3 An Typical Example
- 0.4 Computer Arithmetic and Errors
- Chapter 1: Solving Nonlinear Equations**
- 1.2 Interval Halving (Bisection)
- 1.3 Linear Interpolation Methods
- 1.4 Newton’s Method
- 1.6 Fixed-Point Iteration: $x = g(x)$ Method
- Chapter 2: Solving Sets of Equations**
- 2.2 Matrix Notations
- 2.3 The Elimination Method
- 2.4 Guass and Guass-Jordan Methods
- 2.6 Pathology in Linear Systems, Singular Matrices
- 2.7 Determinants and Matrix Inversion
- 2.10 Iterative Methods (Jacobi and Gauss-Seidel Methods)
- Chapter 3: Interpolation and Curve Fitting**
- 3.2 Lagrangian Polynomials
- 3.3 Divided Differences
- 3.4 Evenly Spaced Data
- 3.8 Least-Squares Approximations
- Chapter 4: Numerical Differentiation and Numerical Integration** .
- 4.2 Derivatives from Difference Tables, Evenly Spaced Data
- 4.5 Newton-Cotes Integration Formula
- 4.6 The Trapezoidal Rule, A Composite Formula
- 4.7 Simpson’s Rules
- Chapter 5: Numerical Solution of Ordinary Differential Equations**
- 5.2 The Taylor-Series Method
- 5.3 Euler and Modified Euler Method
- 5.4 Runge-Kutta Methods