Math 405-WWW Syllabus FALL 2007

Numerical Analysis I

Instructor: Dr. Ianna West

Office: Peltier 106-B
Office Hours: 1T, 4T, 6T ,7T and **Online** MWF 10:00-11:00AM Available for consultation via email or in the Blackboard virtual classroom
Email: ianna.west@nicholls.edu
Phone: 985-448-4394

Section: WWW
On-Campus Section: 5T **Time:** 1:30 – 2:50 **Location:** Peltier 114

Required Text and Other Materials: *Numerical Analysis 8th Edition*, by Richard L. Burden and J. Douglas Faires, also a graphing calculator is required.
Prerequisites: MATH 265, 355, 360, and CMPS 221

Catalog Description: We will cover numerical solutions of equations and systems, convergence theorems, eigenvalue and eigenvector methods, interpolation and extrapolation. Attention to theory with emphasis on methods applicable to high-speed computation.

Student Outcome Objectives:
Student will be able to:

1. identify the types of problems that require numerical techniques for their solution, use appropriate numerical methods to accurately approximate the solution of problems,
2. understand the error propagation that can occur when numerical methods are applied,
3. use techniques for estimating error bounds for the approximations,
4. use computer software packages to approximate the numerical solutions to problems,
5. find the root or zero of an equation and understand when to use the Bisection Method, Newton's Method, or Muller's Method
6. understand the connection between a fixed-point problem and a root-finding problem,
7. understand and apply convergence theorems,
8. understand the difference between a sequence that is linearly convergent and one that is quadratically convergent,
9. use iterated interpolation techniques to generate higher-degree polynomial approximations at a specific point
10. use Divided-difference methods to generate polynomials that approximate given data,
11. use piecewise-polynomial approximation techniques to find an approximation of high-degree polynomials,
12. approximate integrals and derivatives using numerical methods,
13. use iterative techniques to solve linear systems
14. use iterative techniques to determine the eigenvalues and eigenvectors of a matrix.

Course Content and Requirements

Hardware and Software Requirements: The course will be conducted via internet using Blackboard and email. The URL for the university's distance learning website is http://www.nicholls.edu/distance/ . FAQS about internet courses can be viewed at http://www.nicholls.edu/distance/faqs/ . A download for minimum computer requirements for taking a course on Blackboard can be found in the last question on the FAQS site given above. A Blackboard Tutorial can be viewed at http://www.nicholls.edu/distance/blackboard-tutorial/.

Also, you will be required to complete two projects using a computer algebra system CAS (a software program that facilitates symbolic mathematics), such as, Maple, Matlab, Mathematica, etc. During the semester, I will give tutorials on using Maple. However, if you are familiar with another CAS, feel free to utilize that for your projects. At this time Maple is available on the computers in the labs at the university. If you do not have access to the software, the university labs are available to you. The locations and hours of operation for the labs will be announced.

On Campus Meeting Requirements: None
However, MATH 405-WWW students have the option to attend on-campus classes if desired.

Notes: Lecture notes will be available on blackboard no later than 9:00AM the morning of each scheduled class period (Tuesday and Thursday).

Homework*:* Specific problems from the exercises will be assigned after the completion of each section. Students are strongly encouraged to complete these homework assignments to ensure an understanding of the concepts being covered. One problem will be assigned for a grade after the completion of each section. Each problem will be worth 5 points.

Projects*:* There will be two computer projects that will be worth 50 points each.

Exams*:* There will be a midterm exam worth 200 points and a final exam worth 200 points. Dates of exams will be announced. If a student is out-of-state or lives further than two hours from NSU, he or she may request an alternative location to take the test. Arrangements need to be made in advance, so inform the instructor at the beginning of the semester.

Methods of Evaluation: Grade will be calculated on a ten point grading scale 90-100 A, 80-89 B, 70-79 C, 60-69 D, below 60 F. Grade will be determined as follows:

Homework	24 problems@5 points	120 points
Projects	2@50 points	100 points
Midterm		200 points
Final Exam		200 points
Total points		620 points

*****Distribution of points may change during the semester*****

Make-up Procedure: To make up a test, student must have a valid written excuse resulting from an emergency situation since we are only having a Midterm and a Final Exam. Students representing the university in any official capacity will be granted valid excuses and will be allowed to make up a unit test, provided arrangements are made sufficiently in advance with the instructor and documentation of the absence can be produced by the student. If a make-up test must be taken, the student will be required to take the test on the next business day, or as soon as they are released by a doctor, if applicable.

Behavioral Policy: Students must **at no time** be disrespectful toward the instructor. Students must always respect the rights of classmates. Students must behave in a professional manner at all times. Failure to act in an appropriate manner will not be tolerated.

Attendance Policy: Participation in activities is required where an electronic record which clearly indicates time and date activity was submitted. For financial aid purposes, student must complete at least one activity , which is equivalent to having attended a class at least once.

Academic Honesty Policy: Cheating will not be tolerated. Sanctions for academic cheating, plagiarism, and forgery of academic documents including signing another's name (Sec 1.9) are those outlined in the *Code of Student Conduct* handbook.

Academic Grievances:
The proper procedure for filing grade appeals or grievances related to academic matters is listed in Section 5 of the Code of Student Conduct and at the following link:
http://www.nicholls.edu/documents/student_life/code_of_conduct.pdf.

Continued Learning following an Extreme Emergency:
In order to make continued learning possible following an extreme emergency;
Students are responsible for:

- reading regular emergency notifications on the NSU website;
- knowing how to use and access Blackboard (or university designated electronic delivery system);
- being familiar with emergency guidelines;
- evacuating textbooks and other course materials;
- knowing their Blackboard (or designated system) student login and password;
- contacting faculty regarding their intentions for completing the course.

Faculty are responsible for:

- their development in the use of the Blackboard (or designated) software;
- having a plan for continuing their courses using only Blackboard and email;
- continuing their course in whatever way suits the completion of the course best, and being creative in the continuation of these courses;
- making adjustments or compensations to a student's progress in special programs with labs, clinical sequences or the like, only in the immediate semester following the emergency.

Americans with Disabilities Act: If you have a documented disability that requires assistance, you will need to register with the Office of Disability Services for coordination of our academic accommodations. The Office of Disability Services is located in Peltier Hall, Room 100-A. The phone number is (985) 448-4430 (TDD 449-7002).

The last day to drop this course with a "W" is Friday, October 26, 2007

Sections	Chapter 1 Mathematical Preliminaries and Error Analysis
1.1	Review of Calculus
1.2	Round-off Errors and Computer Arithmetic
1.3	Algorithms and Convergence
	Chapter 2 Solutions of Equations in One Variable
2.1	The Bisection Method
2.2	Fixed-Point Iteration
2.3	Newton's Method
2.4	Error Analysis for Iterative Methods
2.6	Zeros of Polynomials and Muller's Method
	Chapter 3 Interpolation and Polynomial Approximation
3.1	Interpolation and the Lagrange Polynomial
3.2	Divided Differences
3.3	Hermite Interpolation
	Chapter 4 Numerical Differentiation and Integration
4.1	Numerical Differentiation
4.3	Elements of Numerical Integration
	Chapter 5 Initial-Value Problems for Ordinary Differential Equations
5.1	The Elementary Theory of Initial-Value Problems
5.2	Euler's Method
5.4	Runga-Kutta Methods
	Chapter 6 Direct Methods for Solving Linear Systems
6.1	Linear Systems of Equations
6.2	Pivoting Strategies
	Chapter 7 Iterative Techniques in Matrix Algebra
7.1	Norms of Vectors and Matrices
7.2	Eigenvalues and Eigenvectors
7.3	Iterative Techniques for Solving Linear Systems
	Chapter 9 Approximating Eigenvalues
9.1	Linear Algebra and Eigenvalues
9.2	The Power Method
9.3	Householder's Method

***** Changes to the syllabus may be made, but the instructor will make reasonable accommodations for students who for some reason may be adversely affected by the change. *****