THE UNIVERSITY OF TEXAS AT EL PASO
COLLEGE OF SCIENCE
Department Of Mathematical Sciences

Course #: MATH 4329 (CRN 11984)
Course Title: Numerical Analysis
Credit Hrs: 3
Term: Fall 2014
Course Meetings & Location: MW 09:00 ~ 10:20, Miners Hall 300
Prerequisite Courses: MATH 3323 and working knowledge of a high level programming language
Course Fee (if applicable) None
Instructor: Dr. Son-Young Yi
Office Location: Chemistry and Computer Science Building 2.0320
Contact Info: E-mail syi@utep.edu
Phone (915) 747-6864
Office Hours: M 1:00 pm ~ 2:00 pm, W 12:30 pm ~ 1:30 pm, or by appointment
Course Website: http://www.math.utep.edu/faculty/yi/math4329f14.html
Course Objectives
(Learning Outcomes): In this course, we study approximate solutions to mathematical problems that cannot be solved or are difficult to solve analytically. We will look at algorithms for solving basic problems and analyze the errors that are introduced. We will also look at the structure of computers and the implications of using them in numerical calculations.

There are three main objectives of this course for students as outlined in the text.
1. Students should obtain an intuitive and working understanding of some numerical methods for the basic problems of numerical analysis.
2. Students should gain some appreciation of the concept of error and of the need to analyze and predict it.
3. Students should develop some experience in the implementation of numerical methods by using a computer. This includes an appreciation of computer arithmetic and its effects.

Course Activities/Assignments: Homework: Homework will be collected approximately every other week. Assignment will be posted on the course website and announced in class. No late homework will be accepted. Computer programming must be done in MATLAB.
Course Schedule:

- **8/25:** Introduction to numerical analysis, Sec.1.1-1.2 Taylor polynomials review
- **8/27:** Sec. 2.1 Floating-point representation
- **9/01:** Labor day – No class
- **9/03:** MATLAB practice
- **9/08:** Sec. 2.1 Rounding and Chopping
- **9/10:** Sec. 2.2 Sources of Errors, Loss of Significance
- **9/15:** Sec. 2.2.4 Underflow and Overflow errors
- **9/17:** Sec. 2.3 Propagation of errors
- **9/22:** Sec. 3.1 Bisection method
- **9/24:** Review for Midterm I
- **9/29:** Midterm I

  - Sec. 3.2 Newton’s method,
  - Sec. 3.3 Secant method
- **10/01:** Sec. 3.2 Newton’s method,
  - Sec. 3.3 Secant method
- **10/06:** Sec. 3.4 Fixed-point iteration
- **10/08:** Sec. 3.5 Ill-behaving root finding problems
- **10/13:** Sec. 4.1 Polynomial interpolation
- **10/15:** Sec. 4.2 Error in polynomial interpolation
- **10/20:** Sec. 4.3 Spline functions
- **10/22:** Sec. 5.1 The trapezoidal rule
- **10/27:** Review for Midterm II
- **10/29:** Midterm II

  - Sec. 5.1 Simpson rule
- **11/05:** Sec. 5.2 Error formulas
- **11/10:** Sec. 5.3 Gaussian numerical integration
- **11/12:** Sec. 5.4 Numerical differentiation
- **11/17:** Sec. 6.1 Systems of linear equations,
  - Sec. 6.2 Matrix arithmetic
- **11/19:** Sec. 6.3 Gaussian elimination
- **11/24:** Sec. 6.4 The LU factorization
- **11/26:** Sec. 6.5 Error in solving linear systems
- **12/01:** Sec. 6.6 Iteration methods
- **12/03:** Review for final
- **12/10:** Final exam (10:00 am – 12:45 pm)

Assessment of Course Objectives: Grade will be based on homework, two midterm exams, and a final exam. No books, notes, or programmable calculators will be allowed. A basic scientific calculator can be used.

- Midterm I: Monday, September 29,
- Midterm II: Wednesday, October 29,
- Final exam: Wednesday, December 10.

Grading Policy: Homework: 30%, Midterm exams: 20% each, Final exam: 30%

Make-up Policy: No make-up/alternate exam will be given.
Attendance Policy: It is student’s responsibility to attend every class. Students are expected to arrive for class on time and to remain for the class entire period.


Civility Statement: Please do not use cell phones, pagers, IPods, MP3 players, blue tooth devices, etc. during class. Cell phones and pagers should be set to silent or vibrate, and any calls should be taken outside of class. Please do not wear headsets or blue tooth devices during class.

Disability Statement: If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at [www.sa.utep.edu/cass](http://www.sa.utep.edu/cass).

Military Statement: If you are a military student with the potential of being called to military service and/or training during the semester, please contact me by the end of the first week of class.