

**THE UNIVERSITY OF TEXAS AT EL PASO**

COLLEGE OF SCIENCE

**Department Of Mathematical Sciences**

Course #: MATH 4329 (CRN 24310)  
Course Title: Numerical Analysis  
Credit Hrs: 3  
Term: Spring 2019  
Course Meetings & Location: MW 09:00 am - 10:20 am, Liberal Arts Building 102  
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: Bell Hall 218  
Contact Info: E-mail syi@utep.edu  
Phone (915) 747-6864  
Office Hours: M 1:30 pm - 2:30 pm, W 10:30 am – 11:30 am, or by appointment

Textbook(s), Materials: Elementary Numerical Analysis, Third Edition, by Atkinson and Han, John Wiley & Sons, 2004.

Course Website: <http://www.math.utep.edu/faculty/yi/math4329s19.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 every week except for the exam weeks. 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:

**1/23:** Introduction to numerical analysis,  
Sec.1.1-1.2 Taylor polynomials review

**1/28:** Sec. 1.2 continued  
Sec. 2.1 Floating-point representation

**1/30:** MATLAB practice

**2/04:** Sec. 2.1 continued

**2/06:** Sec. 2.2 Rounding and Chopping

**2/11:** Sec. 2.2 Errors: sources and examples

**2/13:** Sec. 2.3 Propagation of errors

**2/18:** Sec. 3.1 Bisection method

**2/20:** Review for Midterm I

**2/25:** **Midterm I**

**2/27:** Sec. 3.2 Newton's method,  
Sec. 3.3 Secant method

**3/04:** Sec. 3.4 Fixed-point iteration

**3/06:** Sec. 3.5 Ill-behaving root finding problems

**3/11:** Sec. 7.3 Nonlinear systems

**3/13:** Sec. 4.1 Polynomial interpolation

**3/25:** Sec. 4.2 Error in polynomial interpolation

**3/27:** Sec. 4.3 Spline functions

**4/01:** Review for Midterm II

**4/03:** **Midterm II**

**4/08:** Sec. 5.1 The trapezoidal rule and Simpson's rule

**4/10:** Sec. 5.2 Error formulas

**4/15:** Sec. 5.3 Gaussian numerical integration

**4/17:** Sec. 5.4 Numerical differentiation

**4/22:** Sec. 6.1 Systems of linear equations,  
Sec. 6.2 Matrix arithmetic

**4/24:** Sec. 6.3 Gaussian elimination

**4/29:** Sec. 6.4 The LU factorization

**5/01:** Sec. 6.5 Error in solving linear systems

**5/06:** Sec. 6.6 Iteration methods

**5/08:** Review for final

**5/15:** **Final exam (10:00 am– 12:45 pm)**

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

**Midterm I:** Monday, February 25,

**Midterm II:** Wednesday, April 03,

**Final exam:** Wednesday, May 5, 10am – 12:45pm.

- Grading Policy: Homework: 30%, Midterm exams: 20% each, Final exam: 30%  
Note: A grade of Incomplete is only used in extraordinary circumstances confined to a limited event. If the student has missed a significant amount of work (e.g. multiple assignments or tasks), a grade of Incomplete is not appropriate or warranted.
- Make-up Policy: **No make-up/alternate exam** will be given.
- Course Drop Policy: The UTEP Spring 2017 drop deadline is **April 05, 2019**. The College of Science will remain aligned with the University and not approve any drop requests after that date.
- 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.
- Academic Integrity Policy: <http://admin.utep.edu/Default.aspx?PageContentID=2083&tabid=30292>
- 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](mailto: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.