

THE UNIVERSITY OF TEXAS AT EL PASO
COLLEGE OF SCIENCE
DEPARTMENT OF Mathematical Sciences

Course #: MATH 5329 (CRN 10897), MATH 6329 (CRN 15587)
Course Title: Numerical Analysis
Credit Hours: 3
Term: Fall 2023
Course Meetings & Location: MW 10:30 - 11:50, Physical Science Building 314
Prerequisite Courses: MATH 3323 and programming experience
Course Fee (if applicable) None
Instructor: Dr. Son-Young Yi
Office Location: Bell Hall 218
Contact Info: E-mail syi@utep.edu
Phone 747-6864

Office Hours: M 1:00 pm - 2:00 pm, W 1:30 – 2:30, or by appointment

Textbook(s), Materials: Numerical Analysis, Mathematics of Scientific Computing, Third edition, by D. Kincaid and E. Cheney.

Course Website: Visit my Blackboard course page.

Course Objectives: The objectives of the class are to understand

(Learning Outcomes):

- 1.the principle of numerical methods
- 2.how to implement the methods in a computer language (MATLAB)
- 3.how to apply these methods to application problems

Course Activities/Assignments:

Homework: There will be approximately 5-6 homework assignments this semester. Assignments will be posted on Blackboard and announced in class. Most of the homework problems will be from the textbook. No late homework will be accepted. Your homework should show all necessary work you used to solve problems, and the reasoning and logic underlying all arguments should be clearly spelled out. Some homework assignments will involve computer programming. Computer projects must be done in MATLAB. For every assignment, turn in a complete set of hand-written answers and MATLAB codes along with the outputs.

Assessment of Course Objectives:

There will be a midterm exam and a final exam. They are closed-book exams, hence no books or notes are allowed. But, you can use a basic scientific calculator without graphing or programmable functions. More information will be provided as the exam dates approach.

Midterm exam: Wednesday, Oct. 19 in class.

Final exam: Friday, Dec. 9 from 10:00 am to 12:45 pm.

- Grading Policy: Homework 30%, Midterm exam 30%, Final exam 40%
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. If you have an emergency on the exam day, you have to contact me immediately, preferably before the exam.
- Course Schedule:
- 8/28:** Course introduction
 - Section 2.1: Floating-point numbers and round-off errors
 - 8/30:** Section 2.1 continued
 - 9/04:** **No class** (Labor Day Holiday)
 - 9/06:** Section 2.2: Absolute and relative errors, loss of significance errors
 - 9/11:** Section 2.3: Stable and unstable computations: conditioning
 - 9/13:** Section 3.1: Bisection method
 - 9/18:** Section 3.2: Newton's method
 - 9/20:** Section 3.3: Secant method
 - 9/25:** Section 3.4: Fixed point iteration
 - 9/27:** Section 4.2: LU and Cholesky factorization
 - 10/02:** Section 4.3: Pivoting and constructing an algorithm
 - 10/04:** **Midterm I**
 - 10/09:** Section 4.4: Norms and the analysis of errors
 - 10/11:** Section 4.6: Solution of equations by iterative methods
 - 10/16:** Section 4.7: Steepest Descent and Conjugate Gradient methods
 - 10/18:** Section 4.7 continued
 - 10/23:** Section 6.1: Polynomial interpolation
 - 10/25:** Section 6.2: Divided differences
 - 10/30:** Section 6.3: Hermite interpolation
 - 11/01:** Section 6.4: Spline interpolation
 - 11/03:** **Fall Drop/Withdrawal Deadline**
 - 11/06:** Section 7.1: Numerical differentiation and Richardson extrapolation
 - 11/08:** **Midterm II**
 - 11/13:** Section 7.2: Numerical integration based on interpolation
 - 11/15:** Section 7.2: Method of undetermined coefficients
 - 11/20:** Section 7.3: Gaussian quadrature
 - 11/22:** Section 8.2: Taylor Series methods (including the Euler methods)
 - 11/27:** Section 8.3: Runge-Kutta methods
 - 11/29:** Section 8.4: Multistep methods
 - 12/04:** Section 8.4 continued
 - 12/06:** Section 8.9: Boundary value problem: Finite-Differences
 - 12/15:** **Final exam @ 10:00 am – 12:45 pm**

- Course Drop Policy: The UTEP Fall 2023 drop deadline is **Friday, Nov. 3, 2023**. We will not approve any student- or faculty-initiated drop requests for a course after that date, except under circumstances of complete withdrawal of all courses due to medical or non-medical reasons.
- 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: The University policy is that all suspected cases or acts of alleged scholastic dishonesty must be referred to the Dean of Students for investigation and appropriate disposition. Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. For further information, please refer to:
<http://academics.utep.edu/Default.aspx?tabid=23785> or
<http://www.lib.iastate.edu/commons/resources/facultyguides/plagiarism/dishonest.html>.
- Civility Statement: Please do not use cell phones or laptops during class. Cell phones 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 a student has or suspects she/he has a disability and needs an accommodation, he/she should contact the Disabled Student Services Office (DSSO) at 747-5148 or at <dss@utep.edu> or go to Room 106 Union East Building. The student is responsible for presenting to the instructor any DSS accommodation letters and instructions.
- 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.

Covid 19 Precaution Statement Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID 19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org