THE UNIVERSITY OF TEXAS AT EL PASO

COLLEGE OF SCIENCE

Department of Mathematical Sciences

Course #:	MATH 4329 001 (CRN 21144)
Course Title:	Numerical Analysis
Credit Hrs:	3
Term:	Spring 2021
Course Meetings & Location:	MW 9:00 - 10:20, Virtual class meetings via Zoom Meeting ID & Passcode: TBA
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
Virtual Office Hours:	The office hours will be held virtually on MW: 15:00 ~ 16:00 via Zoom. Meeting ID & Passcode: TBA
Textbook(s), Materials:	Elementary Numerical Analysis, Third Edition, by Atkinson and Han, John Wiley & Sons, 2004.
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 will be collected every week except for the exam weeks. Assignments will be posted on Blackboard and collected via Gradescope. 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 programs along with the outputs.

Matlab software

Matlab is an interactive environment for numerically manipulating arrays and matrices, as well as providing tools for visualizing data. You can download the software on your own computer unless it is already installed on your computer.

1. Open a browser and navigate to utep.edu/matlab.
2. Sign in to Math Works account. If you don't have a Math Works account, use your UTEP credentials to open an account.
3. Follow the instructions on the screen to download and run Matlab on your computer.

If you are new to Matlab, you will find the following tutorial very helpful: https://www.mathworks.com/support/learn-with-matlab-tutorials.html

Course Schedule

1/20: Course introduction
Sec.1.1-1.2 Taylor polynomials review
1/25: Sec. 1.2 continued
1/27: Computer lab-MATLAB introduction
2/01: Sec. 2.1 Floating-point representation
2/03: Sec. 2.2 Rounding and Chopping
2/08: Sec. 2.2 Errors: sources and examples
2/10: Sec. 2.3 Propagation of errors
2/15: Sec. 3.1 Bisection method
2/17: Sec. 3.2 Newton's method
2/22: Sec. 3.3 Secant method
2/24: Sec. 3.4 Fixed-point iteration
3/01: Sec. 3.5 Ill-behaving root finding problems
3/03: Sec. 7.3 Nonlinear systems
3/08: Midterm exam review
3/10: Midterm exam
3/15 – 3/19: Spring Break
3/22: Sec. 4.1 Polynomial interpolation
3/24: Sec. 4.2 Error in polynomial interpolation
3/29: Sec. 4.3 Spline functions
3/31: Sec. 5.1 & 5.2 The trapezoidal rule and error formulas
4/01: Spring Drop/Withdrawal Deadline
4/05: Sec. 5.1 & 5.2 Simpson's rule and error formulas
4/07: Sec. 5.3 Gaussian numerical integration
4/12: Sec. 5.4 Numerical differentiation
4/14: Sec. 6.1 Systems of linear equations,
Sec. 6.2 Matrix arithmetic
4/19: Sec. 6.3 Gaussian elimination
4/21: Sec. 6.4 The LU factorization
4/26: Sec. 6.5 Error in solving linear systems
4/28: Sec. 6.6 Iteration methods
5:03: Final exam review
5/05: Study day
5/12: Final exam (10:00 am – 12:00 pm)

Assessment of **Course** Objectives:

The final grade will be based on homework assignments, a midterm exam, and a final exam. The exam will be administered using Respondus Lockdown Browser and Zoom. No notes or textbook materials are permitted during the test. The following dates are tentative exam dates. Please, mark your calendar.

Midterm 1: Wednesday, March 10, 8:30 am – 10:30 am
Final exam: Wednesday, May 12, 10:00 am-12:00 pm.

Grading Policy:	Homework: 40%, Midterm exam: 30%, Final exam: 30% Note: A grade of Incomplete will be given only 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:	Make-up exams will be given only in the case of a **documented emergency** (e.g. hospitalization, immediate family member's funeral). It is important that you reach out to me in advance if at all possible and explain with proper documentation.
Test proctoring software	The exams will be available in Gradescope and they will be administered using Respondus Lockdown Browser and Zoom to promote academic integrity. You are encouraged to learn more about how to use these programs prior to the first midterm exam. Please, review the following guidelines: • A reliable internet connection is essential to completing the exam. If you must go to a location to take the exam (such as the library), be sure to follow their health and safety requirements. • Respondus Lockdown Browser will require that all internet tabs are closed prior to the start of the test. • You will need to install OneDrive on your computer and your phone to transfer files from your phone to your computer without using an email service. • You will need a document scanning app on your phone (e.g., Genius app). • You will be required to show your student ID and your surrounding prior to the start of each test through your phone camera. • No notes or textbook materials are permitted during the test. • You should not have any communications with other people and/or leave and return to the area during the test.
Alternating means of submitting work in case of technical issues:	I strongly suggest that you submit your homework with plenty of time to spare in the event that you have a technical issue with Blackboard, network, or your computer.
Attendance Policy:	Students are expected to participate in scheduled Zoom sessions with a webcam and microphone. Students should not record the sessions and post them to any sites outside of Blackboard.
Academic Integrity Policy:	Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not

limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) for possible disciplinary action. To learn more, please visit HOOP: Student Conduct and Discipline.

Course Drop Policy:

The UTEP Spring 2020 drop deadline is **Thursday, April 1, 2021**. The College of Science will remain aligned with the University and not approve any drop requests after that date.

Accommodation Policy:

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the UTEP Center for Accommodations and Support Services (CASS). Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at cass@utep.edu, or apply for accommodations online via the CASS portal.