

University of Tennessee
Math 472 Numerical Algebra
Section: 2; CRN: 20407; Meets: TR 2:10 PM - 3:25 PM
Syllabus Spring 2020

Welcome to Our Numerical Algebra Class

Prerequisites: Matrix Algebra (Math 200, 251 or 257), and Math 371.

Instructor: Dr. Wenbo Li

Office Hours and Location: Monday 3:00pm-4:00pm, Thursday 3:40pm-5:00pm in Ayres Hall 207 & by appointment.

Ways to contact: wli50@utk.edu, or messages on canvas.

Course Communications: I will post course materials, grades, and class announcements on Canvas. You are always welcome to contact me through email or canvas, but if you have a question about math, I think a better way is to come to my office hours or make an appointment so we can discuss it face to face.

Key Dates - Spring 2020: [UT Calendar](#)

Student Learning Outcomes: Upon completion of Math 472, students will be able to

- Approximate the solution of equations numerically
- Solve linear equations through different numerical methods
- Compute eigenvalues of a given matrix numerically

Materials: The textbook for this class is: *An Introduction to Numerical Analysis, 1st Edition*, Endre Suli and David Mayers, Cambridge University Press. I plan to cover chapters 1-5. Another reference is the book "Numerical Analysis, Mathematics of Scientific Computing", 3rd edition by D. Kincaid and W. Cheney.

Learning Environment and Classroom Expectations/Etiquette:

Everyone is expected to maintain an atmosphere that fosters a positive learning environment.

- Attendance to every class is mandatory.
- Questions are welcomed
- Reading ahead textbook materials in preparation for each class is highly encouraged
- Eating food in the classroom is not allowed.

Assessment and Evaluations Methods (NO EXTRA POINTS):

Collected homework (10%) + Quizzes (24%) + Midterm exams (36%) + Final (30%)

Homework: Homework problems will be assigned on canvas, and there will be both theoretical and computational problems. Coding is needed to complete computational assignments, and I highly recommend you to use MATLAB although C/C++ or Python is also allowed. I will only collect and grade computational assignments, but you are required to understand all the problems since quizzes and exams are related to the homework.

Quizzes: there will be 6 quizzes in total, and I will announce the date of quizzes in advance.

Midterms: two in class midterm exams on **Feb 27 (in-class)** and **Apr 14 (take-home)**.

Final: a comprehensive exam covering all the materials will be at 2:45 p.m. – 4:45 p.m. Wednesday, April 29. We will meet on zoom at the exam time.

Letter grades will be based on the following scale:

Grade	A	B+	B	C+	C	D+	D	F
%-Score	90+	87-89	80-86	77-79	70-76	67-69	60-66	0-59

I reserve the right to change this scale, provided the change benefits all students. All grades will be made available online.

Calculators: The use of a calculator as an auxiliary tool is allowed in this class. Devices with Internet capability such as cellphone calculators are prohibited during the quizzes and exams. To obtain credit, all the steps leading to the solution of a problem must be clearly written.

Make Up Policies: There will be NO make up for the quizzes. Late homework submission is not acceptable unless for a valid reason. Make ups for the in-class exams and final will be given only if a student can present evidence that an absence was caused by serious illness, a death in the immediate family, religious observance, or participation in University activities at the request of University authorities. For an illness, you must present a signed statement from a doctor that your illness was sufficiently serious to make you miss class. A note saying only that you visited the doctor or the Health Center will not Suffice.

[Campus Syllabus:](#)

STUDENTS WITH DISABILITIES -- <http://sds.utk.edu>

“Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Student Disability Services (SDS) at 865-974-6087 in 100 Dunford Hall to document their eligibility for services. Student Disability Services will work with students and faculty to coordinate reasonable accommodations for students with documented disabilities.”

ACADEMIC INTEGRITY

Each student is responsible for his/her personal integrity in academic life and for adhering to UT's Honor Statement. The Honor Statement reads: "An essential feature of the University of Tennessee, Knoxville is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the university, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity."

How to be Successful in this Course:

- Show up in class and be on time.
- Listen carefully, take notes, and ask questions during the lecture.
- Think, work smarter and discuss with classmates after class.
- Review and rework problems that you got wrong.
- Start preparing for exams early.

If the instructor finds it necessary to make informational changes (e.g. office hours, schedule adjustments) due to students' needs or unforeseen circumstances, students will be notified in writing/email of any such changes.

Math 472 Projected Schedule Spring 2020

	Section	Homework and Quiz Information
1/9	Ch. 1. The end point tests and Brouwer's Fixed Point.	
1/14	Ch. 1. Simple Iteration and Contraction Mapping Theorem.	Homework 1
1/16	Ch. 1. Convergence to the fixed point.	
1/21	Ch. 1. Stable and unstable fixed points. Rate of convergence.	Homework 2
1/23	Ch. 1. Newton's method	Quiz 1 covering Hmwks 1 and 2.
1/28	Ch. 1. Convergence of Newton's method and Secant method.	Homework 3
1/30	Ch. 1. Bisection.	
2/4	Ch. 2. Linear systems of equations.	Homework 4
2/6	Ch. 2. Gaussian elimination	Quiz 2 covering Hmwks 3 and 4.
2/11	Ch. 2. $A = LU$ factorization.	Homework 5
2/13	Ch. 2. More LU factorization and Pivoting strategies.	
2/18	Ch. 2. The $PA = LU$ factorization.	Homework 6

2/20	Ch. 2. Vector and matrix norms.	Quiz 3 covering Hmwks 5 and 6.
2/25	Ch. 2. More Vector and matrix norms.	
2/27	Exam 1	
3/3	Ch. 2. Condition number and stability.	Homework 7
3/5	Ch. 2. More Condition number and stability..	
3/10	Ch. 2. Linear Least Squares.	Homework 8
3/12	Ch. 2. QR factorization.	Quiz 4 covering Hmwks 7 and 8.
3/17	Spring Break	
3/19	Spring Break	
3/24	Ch. 3. Positive Definite matrices. The Cholesky factorization.	Homework 9
3/26	Ch. 3. Tridiagonal and diagonally dominant matrices.	
3/31	Ch. 3. Tridiagonal and diagonally dominant matrices and Gaussian Elimination.	Homework 10
4/2	Ch. 4. Fixed point iteration in higher dimensions.	Quiz 5 covering Hmwks 9 and 10.
4/7	Ch. 4. Newton's method in higher dimensions.	Homework 11
4/9	Spring Recess No Class Day	
4/14	Exam 2	
4/16	Ch. 5. Eigenvalues and Jacobi method	Homework 12
4/21	Ch 5. Inverse Iteration.	Quiz 6 covering Hmwks 11 and 12.
4/23	Review	
4/29	Final Exam	Comprehensive Exam: 2:45 p.m. – 4:45 p.m. Wednesday, April 29. GOOD LUCK!!!