MATH 1554 Linear Algebra

GEORGIA TECH EUROPE

COURSE SYLLABUS

Updated on Jan 30 2026

Welcome to Linear Algebra!

All our students play an important role in our educational mission.

Course Description

Course Title: **Math 1554, Linear Algebra**

Course Meeting Times: Lectures : M,W 1:30 – 3:25 Blue Room

Studio : T, Th 1:30 – 2:45 Blue Room

Instructor

Instructor: Hyun Jeong KIM   **Office**: **303**   **E-mail**: hkim3224@gatech.edu

Office Hours: M,T, W, Th 9:30 – 12:00

1. Course Goals, Objectives, and Topics

The primary goal of Math 1554 is to prepare students to succeed in upper level courses that require this course as a pre-requisite. To this end we will:

- Explore fundamental concepts of linear algebra from a mathematical perspective.
- Discuss study strategies during lecture and studio to help prepare students for exams.

Learning objectives articulate what students are expected to do in a course. The learning objectives for this course are as follows.

1. Construct, or give examples of, mathematical expressions that involve vectors, matrices, and systems of linear equations. For example: construct an invertible matrix with four columns that is not diagonalizable.
2. Evaluate mathematical expressions to compute quantities that deal with linear systems and eigenvalue problems. Examples: compute the singular value decomposition of a given matrix, or construct the LU decomposition of a rectangular matrix.
3. Analyze mathematical statements and expressions. For example: assess whether a given statement is accurate, or describe solutions of systems in terms of existence and uniqueness.
4. Write logical progressions of abstract mathematical arguments. For example, to explain why a square matrix with linearly independent columns is invertible.
5. Apply linear algebra concepts to model, solve, and analyze real-world situations.
6. Identify course-related information, policies, and procedures that are contained in the syllabus and related course websites.

Topics indicate what material is covered in a course. Some of the topics explored in this course are:

- Methods for solving systems of linear equations, such as row reduction and matrix decompositions such as the LU and SVD decompositions.
- Geometry of linear transformations.
- Characterizations of invertible matrices and determinants.
- Eigenvalue and eigenvectors, and their uses.
- The structure of a linear transformation, including decompositions, such as LU, spectral or singular value decompositions.
- Orthogonal projections and their application to determine best-fit solutions to over-determined systems of linear equations.

This is a Core IMPACTS course that is part of the <u>STEM</u> area.

Core IMPACTS refers to the core curriculum, which provides students with essential knowledge in foundational academic areas. This course will help master course content, and support students' broad academic and career goals.

This course should direct students toward a broad <u>Orienting Question</u>:

- How do I ask scientific questions or use data, mathematics, or technology to understand the universe?

Completion of this course should enable students to meet the following <u>Learning Outcome</u>:

- Students will use the scientific method and laboratory procedures or mathematical and computational methods to analyze data, solve problems, and explain natural phenomena.

Course content, activities and exercises in this course should help students develop the following <u>Career-Ready Competencies</u>:

- Inquiry and Analysis
- Problem-Solving
- Teamwork

2. Textbook, Course Websites and Prerequisite

Textbook: Lay, Linear Algebra and its Applications, 6th Edition.
Course Website: canvas.gatech.edu

Math1554 Master Website :   <u>https://gatech.instructure.com/courses/114544</u>

on this site, you can find

- Exams from past semesters
- Blank and annotated common lecture notes from last semester
- Supplementary Lecture Videos

Prerequisites: Math SAT Section Score (new SAT) of 620 or ACT 26 or ACT equivalent 600 or MATH 1113 Precalculus or 15X2 or 1X52 or MATH 1552 Integral Calculus.

3. Expectations

3.1 Students

Students are expected to attend all lectures and studios unless feeling sick or in quarantine, complete all assignments on time, study the subject matter outside of class, review this syllabus, review their graded work in a timely manner for potential marking errors and to review where mistakes were made (if any), and ask for help when needed. A few suggestions on how to succeed in this class include:

- Read and reread the textbook and think about what you have read. Our textbook is not chatty.
- It is best to read the corresponding portion of the book right before it is covered in class.
- Do all homework.
- Attend lectures and studios; while some rare individuals can do well without going to class, there is a strong evidence that those who attend most lectures and studios get a better grade.

- Join/form a study group: explaining ideas to others helps clarify them for yourself, not to mention that your peers may have something to teach you too, and most importantly to tell you when you are wrong.
- Always go to review sessions.
- Do not hesitate to ask questions, in class or come to instructor and/or TA office hours etc.

3.2 Teaching Assistants (TAs)

TAs are responsible for facilitating learning activities during studio and administering the in-studio quizzes, holding office hours, and responding to questions from students during office hours and studio.

3.3 Instructor

Instructors provide learning objectives that define what students are expected to be able to learn, facilitate interactive lectures, coordinate with teaching assistants to facilitate learning activities, provide students with assessments that both develop and measure your understanding and knowledge of the subject matter, provide feedback on your performance, provide solutions to midterms, and be available for assistance when requested.

4. Announcements

Students are responsible for obtaining announcements and materials placed on the course website (Canvas).

5. Preparing for Midterms and the Final Exam

Practice materials, Review sessions and additional office hours will be offered prior to midterms and the final exam. Depending on your goals, you may need to complete additional work beyond homework, worksheets, and practice midterms to adequately prepare for the exams.

6. Assessment

HOMEWORK: Homework will be assigned on-line every week via **Webwork**. Each homework will be due on Tuesdays at 11:59 PM *at which time the solutions will also become available.*

Math is not a spectator sport! Homework is an essential part of the course; the only way to learn math is by doing math.

a. You are expected to understand **all** homework problems for the exams and quizzes. We strongly recommend working homework problems out completely on paper even though that work is not graded- this is your chance to build good habits in your work and ensure you understand every step.

b. ***Late homework will not be accepted, and no extensions will be given for any reason.*** All homework due dates are currently posted on the WebWork system and on our course Calendar. Each homework is assigned a week earlier and so you have time to finish it earlier if you expect some conflicts on the due date.

c.   There are 10 weekly homework of total 183 points approximately and each weekly homework consists of 2-3 sections of Webwork questions that are due on the same day. The homework component of your grade will be the fraction of points you earn out of 155, capped at 100% (equivalent to 10 pts of the final grade) and the rest of the points will be given as bonus to the final exam score up to 1% not to exceed 100%.

d.   You are very welcome to **collaborate with other students on solving homework problems**; in fact, we encourage you to do so. Talking with others gives you a chance to consider issues you might not have thought of yourself and often improves your understanding. You learn the best when you teach someone. However, it is important that you understand the homework yourself by the end, or quizzes and exams will be of extreme difficulty. Of course, it is *always* unacceptable to copy a solution from any source or to look up answers online.

PARTICIPATION: Attending class is important. Class attendance for both lectures and studios will be recorded and scored on a 0-2.5 scale out of 2 points. The scale is determined as follows: 2.5 points for above 90% attendance for both Lecture and Studio, 2 points for above 80% attendance for both Lecture and Studio, and 1 point for above 80% in one and 80-60% in the other, and 0 otherwise. The participation grade will be added onto the final average with a possible 0.5 bonus at the end of the term. Late arrivals and early departure will be noted and three of these will be counted as one absence.

QUIZZES: There will be 7 quizzes of 20 minutes on every **Thursdays** during Studio except when there's a midterm or when there's a public holiday. **Two** lowest quiz scores will be dropped. Each quiz is graded out of 20 points and the total quiz grade out of 100 consists of 5 best quizzes, which is 20% of the final grade – see below the distribution table.

MIDTERMS: There will be 2 midterms of 75 minutes on **Thursdays** during Studio. There's no dropping for midterm. Each midterm is graded out of 50 points and the total midterm grade out of 100 consists of 60% of the better midterm + 40% of the other, which is 30% or 38% of the final grade - see below the distribution table.

Important : **The dates for all the tests** are already published - **see the last page.** Please do not make any plan for travel for these dates as no make-up or earlier tests will be allowed due to travels! Missing test will be marked as 0.

FINAL EXAM: The final exam will cover all course materials and will be administered during the final exam period (the exact date will be announced later.) for 2 hours and 50 minutes. All students must take the final examination and should not plan for travel during the final exam period before all the exam dates are fixed. No earlier or late exam will be allowed for travel plans.

Grades Distribution

Final grades will be calculated using whichever of the following weights yields the higher grade.

Assessment	Weight 1	Weight 2
Participation	2% (possible 0.5pt bonus)	2% (possible 0.5pt bonus)
Webwork Homework	10%	10%
5 best Quizzes	20%	20%
2 Midterms (Better midterm 60% + The other 40%)	30%	38%

Final Exam (possible 3% bonus)	38%	30%

CIOS Bonus: When the participation to the survey for both Lecture and Studio is above 85%, there will be 2% bonus to the final exam score not to exceed 100%.

Letter grades will be determined based on the usual intervals. **A**: 90% and higher, **B**: [80%, 90%), **C**: [70%, 80%), **D**: [60%, 70%), **F**: [0%, 60%). For example, a final grade of 89.99% is converted into a B, a final grade of 79.99% is converted into a C, and so on. There will be NO changes to these intervals because there will be an appropriate curve or make-up test depending on the average for each test. No individual curve, extra credits, or make-up exam (except for absences.) Please do NOT email me asking for extra credits.

7. Office Hour and Extra Help

To get help with our course materials, use the office hour of myself and TA. If you need help outside office hours, make appointment with me by email.

For those who need help with prerequisite materials such as College algebra, Precalculus and Calculus, a few sessions with TA will be suggested.

8. Tips for Success

To succeed in a Math class, the minimum work you need to do is:

- Read Course Slides and review examples done in class thoroughly.

- Review worksheet questions done in Studio.

- Do homework and practice with the rest of the questions on the worksheets.

- Most importantly, as soon as you find the course a bit challenging, you should use office hours regularly not to get behind.

9. Missed Exams and Re-grade Requests

NO MAKE-UP EXAMS! All the test dates are already published. No make-up or earlier test will be allowed due to travel. Please do not make any plan for travel for these dates and missing test score will be "0".

- In the case of illness and emergency, please contact me as early as possible.
- Requests for student organization excused absences must be made no later than two weeks prior to the date of the event. No late requests will be honored. Please have your advisor send me a written notice or an e-mail.
- Students who are absent because of participation in a particular religious observance will be permitted to make up the work missed during their absence with no late penalty, provided the student informs me of the upcoming absence, in writing, within the first two weeks of class, and provided the student makes up the missed material within the timeframe established by the course instructor.

- If you have off campus interviews for jobs or graduate/professional schools on the test dates, please contact me as early as possible with a supporting document.

10. Class Policy

In the event of an absence, you are responsible for all missed materials, assignments, and any additional announcements or schedule changes given in class. Class disruptions of ANY kind will NOT be tolerated and may result in your removal from the classroom. Please show courtesy to your fellow classmates and instructor by adhering to the following class rules.

- Come to class **on time** and stay for the entire class period. If you need to leave the class early, please let me know at the beginning of the class.

- Refrain from conversing with your fellow students while the instructor is lecturing.

- Put away any reading materials unrelated to the course.

- **No laptop or cell phone is allowed on tables.** Please keep them **in your bag** with sound off.

11. Class Policies and Statements

11.1 Email Etiquette

When sending email to your instructor or TA, please use your GT email account. Please also indicate which class you are taking with your instructor (your instructors teach more than one course per semester), keep your email messages as succinct as possible, but give your instructor enough information as they need to process your request.

11.2 Academic Dishonesty

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit http://osi.gatech.edu/content/honor-code. Any student suspected of cheating or plagiarizing on any exam will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Any evidence of cheating or other violations of the Georgia Tech Honor Code will be submitted directly to the Dean of Students, and results in a zero for the assignment and the forfeiture of any class bonus. Cheating includes, but is not limited to the following.

- Using a calculator, cell phone, books, or any form of notes on exams.
- Copying directly from **any** source during an exam, including friends, classmates, Reddit or another online forum, or a solutions manual.
- Allowing another person to copy your work, or posting your work to an online forum before grades are released/after everyone has taken the quiz/exam.
- Taking a test using someone else's name, or having someone else take a test in your name.
- Asking for a re-grade of a paper that has been altered from its original form.

- Using someone else's name to take tests for them, or asking someone else to use your identity for any graded or participation submission.

11.3 Students with Disabilities and/or in need of Special Accommodations

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or http://disabilityservices.gatech.edu, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

11.4 Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See http://www.catalog.gatech.edu/rules/22/ for an articulation of some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

11.5 Statement of Intent for Inclusivity

As a member of the Georgia Tech community, I am committed to creating a learning environment in which all of my students feel safe and included. Because we are individuals with varying needs, I am reliant on your feedback to achieve this goal. To that end, I invite you to enter into dialogue with me about the things I can stop, start, and continue doing to make my classroom an environment in which every student feels valued and can engage actively in our learning community.

12. Campus-Wide Dates

May 20 First day of class (Wednesday)

May 29, July 10 and July 17 classes exceptionally on Friday.

May 25 (Monday), July 13, 14 (Monday, Tuesday) Bank Holiday

July 27, 28 Last Instructional Days

July 29 – August 6 Final Exams Period

Chapter Titles : Chapters referred to in the schedule below are as follows.

- Chapter 1: Linear Equations in Linear Algebra
- Chapter 2: Matrix Algebra
- Chapter 3: Determinants
- Chapter 4: Vector Spaces

- Chapter 5: Eigenvalues and Eigenvectors
- Chapter 6: Orthogonality and Least Squares
- Chapter 7: Symmetric Matrices and Quadratic Forms

TENTATIVE SCHEDULE

Week	Section Coverage	Tests	Dates
Week 1 **May 20 – 22**	L : Syllabus, 1.1, 1.2 S : WS 1.1, 1.2 L : 1.3, 1.4, Pretest	Prerequisite Test **on May 29 (Fri)**	First day of Class on May 20 (Wed) Lecture on May 22 (Fri) exceptionally
Week 2 **May 26 – 29**	S : WS 1.3, 1.4 L : 1.5, 1.7 S : WS 1.5, 1.7, Quiz 1 L : 1.8, 1.9	Quiz 1 **on May 28 (Thu)** on sections 1.1, 1.2, 1.3, 1.4	May 25 (Mon) Bank Holiday HW 1 due May 27 (Wed) Lecture on May 29 (Fri) exceptionally
Week 3 **June 1 - 4**	L : 2.1, 2.2 S : WS 1.8, 1.9, 2.1, 2.2 L : 2.3, 2.4, 2.5 S : WS 2.3, 2.4, Quiz 2	Quiz 2 **on June 4 (Thu)** on sections 1.5, 1.7, 1.8, 1.9	HW 2 due June 2 (Tue)
Week 4 **June 8– 11**	L : 2.8, 2.9 S : WS 2.5, 2.8, 2.9 L : Review S : Mid 1	Mid 1 **on June 11 (Thu)** on sections 1.1-5, 1.7-9, 2.1-5	HW 3 due June 9 (Tue)
Week 5 **June 15 – 18**	L : 3.1, 3.2, 3.3 S : WS 3.1, 3.2, 3.3 L : 4.9, 5.1 S : WS 4.9, 5.1, Quiz 3	Quiz 3 **on June 18 (Thu)** on sections 2.8, 2.9	HW 4 due June 16 (Tue)
Week 6 **June 22 - 25**	L : 5.2, 5.3 S : WS 5.2, 5.3 L : 5.3, 5.5 S : WS 5.3, 5.5, Quiz 4	Quiz 4 **on June 25 (Thu)** on sections 3.1-3, 4.9, 5.1	HW 5 due June 23 (Tue)
Week 7 **June 29 – July 2**	L : 6.1, 6.2 S : WS 6.1, 6.2 L : 6.2, 6.3 S : WS 6.2, 6.3, Quiz 5	Quiz 5 **on July 2 (Thu)** on sections 5.2, 5.3, 5.5	HW 6 due June 30 (Tue)
Week 8 **July 6 -- 10**	L : 6.4, 6.5 S : WS 6.4, 6.5 L : Review S : Mid 2 L : 6.6, PageRank	Mid 2 **on July 9 (Thu)** on sections 2.8-9, 3.1-3, 4.9, 5.1-3, 5.5, 6.1-3	HW 7 due July 7 (Tue) Lecture on July 10 (Fri) exceptionally
Week 9 **July 15 – 17**	L : 7.1, 7.2 S : WS 6.6 S : WS 7.1, 7.2, Quiz 6	Quiz 6 **on July 17 (Fri)** on sections 6.4, 6.5, 6.6	HW 8 due July 16 (Thu) Studio on July 17 (Fri) exceptionally
Week 10 **July 20 - 23**	L : 7.3 S : WS 7.3 L : 7.4 S : WS 7.4, Quiz 7	Quiz 7 **on July 23 (Thu)** on sections 7.1, 7.2	HW 9 due July 21 (Tue)
Week 11 **July 27, 28**	L : Review for Final S : Review for Final	Final Exam on sections 1.1-7.4	HW 10 due July 28 (Tue) Last Lecture on July 27 Last Studio on July 28