

SUNY Korea
AMS
Spring 2024

Applied Linear Algebra
AMS 210-90
Rev. 2/25/2024

SYLLABUS

INSTRUCTOR: Dr. Ky Tran

OFFICE: B525

LECTURE: MW 10:30 – 11:50, ROOM: C105

OFFICE HOURS: MW 1:45 PM - 3:15 PM

EMAIL: ky.tran@stonybrook.edu

PHONE: 82-32-626-1911

TA AND TA OFFICE HOURS:

Ziwoo Jun, ziwoo.jun@stonybrook.edu, TUTH 5:00 - 6:00 PM

Jimin Han, jimin.han.1@stonybrook.edu, TUTH 2:00 - 3:00 PM

Hyunin Hwang, hyunin.hwang@stonybrook.edu, TH 11:30 AM - 12:30 PM, 3:00 - 4:00 PM

COURSE WEBSITE: Brightspace

COURSE DESCRIPTION: An introduction to the theory and use of vectors and matrices; matrix theory including systems of linear equations; theory of Euclidean and abstract vector spaces; eigenvalues and eigenvectors; linear transformations.

PREREQUISITES: AMS 151 or MAT 131 or MAT 141 or MAT 126, or level 7 on the mathematics placement examination.

TEXTBOOK: “Contemporary Linear Algebra”, by Howard Anton, Robert C. Busby, Wiley Publisher, 1st edition, ISBN: 978-0471163626.

TOPICS TO BE COVERED:

1. Vectors
2. Solving systems of linear equations
3. Matrices: matrix algebra, matrix operations, determinants, eigenvalues and eigenvectors

4. Linear transformations
5. Applications
6. Introduction to general vector spaces

HOMEWORK: Homework assignments will be assigned on a weekly basis. It's important to note that late submissions will not be accepted. For full credit, ensure that you answer the questions in the order they are given and provide detailed, complete solutions for each question. Neatness and legibility are crucial - your instructor needs to be able to read your work easily. This is your chance to demonstrate your understanding of the material.

While you are encouraged to discuss homework problems with classmates, teaching assistants, or your instructor, the solutions you submit must be your own work. This is essential for your assignments to be considered for grading.

All homework must be submitted electronically through Brightspace. To avoid issues with lost assignments, no paper homework will be collected. Please write your solutions on paper first. Then, use a scanner or a mobile scanning application (such as Adobe Scan, available on the Play Store or Apple Store, or CamScanner) to digitize your assignment. Ensure that you compile your work into ONE single PDF file. This PDF should be submitted on Brightspace under the respective assignment section. Please note that submissions consisting of multiple PDFs or in formats other than a single PDF will not be accepted and consequently, will not be graded.

To accommodate any challenges you may encounter over the course, we will drop the lowest two homework scores when calculating your average.

EXAMS:

Exam 1 (tentative): Monday, April 1, 2024, in class

Exam 2 (tentative): Wednesday, May 8, 2024, in class

Final: TBA

No make-ups are allowed if you miss an exam without serious and documented reason.

GRADING POLICY

The final grade is based upon the following:

Homework: 20%; Exam 1: 25 %; Exam 2: 25%; Final: 30%.

By the School Policy of Attendance, if a student has more than 20% unexcused absences, the student's final grade will be an F.

Grade Scale:

Percentage	[0, 60)	[60, 70)	[70, 73)	[73, 77)	[77, 80)
Grade	F	D	C-	C	C+

Percentage	[80, 83)	[83,87)	[87, 90)	[90, 93)	[93, 100]
Grade	B-	B	B+	A-	A

CELL PHONE AND OTHER ELECTRONIC DEVICES: Cell phone use and the use of other electronic devices are not permitted in class to avoid distractions. Please ensure that your cell phones are set to silent mode and all electronic devices are turned off during class hours. If you anticipate an emergency call, kindly sit near the door so you can answer the call outside the classroom without disturbing others.

Learning Outcomes After completing this class, students will be able to:

1. Become familiar with a diverse set of linear models and use them to interpret theory and techniques throughout the course:
 - a system of 3 linear equations in 3 unknowns;
 - a Markov chain model;
 - a dynamic (iterative) linear systems of equations;
 - a general equilibrium model.
2. Compute and apply basic vector-matrix operations:
 - scalar products;
 - matrix-vector products;
 - matrix multiplication.
3. Demonstrate diverse uses of scalar and vector measures of a matrix:
 - matrix norms;
 - dominant eigenvalue and dominant eigenvector.
4. Solve a system of linear equations using:
 - Gaussian elimination;
 - determinants;
 - matrix inverses;
 - iterative methods,
 - least squared approximate solutions using pseudo-inverses.
5. Demonstrate how Gaussian elimination determines if a system of linear equations is:
 - overdetermined;
 - underdetermined – and how to determine the family of solutions;
 - uniquely determined – and find the solution.
6. Apply basic ideas of numerical linear algebra:
 - computational complexity of matrix operations;
 - LU decomposition;

- using partitioning to simplify matrix operations;
 - ill-conditioned matrices and the condition number of a matrix.
7. Learn and use basic theory about the vector spaces associated with a linear transformation:
- linear independence;
 - the null space;
 - the range space;
 - orthonormal spaces.
8. Examine a sampling of linear models, chosen from linear regression, computer graphics, markov chains, and linear programming.
9. Strengthen ability in communicating and translating of mathematical concepts, models to real world settings:
- present solutions to problems in a clear, well-laid out fashion;
 - explain key concepts from the class in written English;
 - convert problems described in written English into an appropriate mathematical form;
 - convert the mathematical solutions into a written answer.

School Policy on Attendance

1. If a student has over 20% unexcused absences, the student's final course grade will be an F.
2. Students should report the reason of absence to the professor in advance, or immediately after the absence.
3. When a student excuses his/her absence, the student must provide documentation of the reason for the absence to the professor.
4. The professor of the course reserves the right to excuse absences.
5. The professor may excuse the absence if the submitted documentation fulfills the following conditions: extreme emergencies, severe medical reasons with doctor's note, very important events.

Academic Integrity

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Cheating Policy

The grade of Q is assigned to a student found guilty of academic dishonesty. The Q remains on the transcript and is computed in your G.P.A. as a grade of F. Furthermore, a note describing the academic dishonesty is attached to your permanent records with the university.

Disability Support Services (DSS) Statement

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact One-Stop Service Center, Academic Building A201, (82) 32-626-1117. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. In addition, this statement on emergency evacuation is often included, but not required. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and One-Stop Service Center.

Critical Incident Management

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn.

Course Evaluations

Stony Brook University values student feedback in maintaining the high quality education it provides and is committed to the course evaluation process, which includes a mid-semester assessment as well as an end-of-the-semester assessment, giving students a chance to provide information and feedback to an instructor which allows for development and improvement of courses. Please click the the following link to access the course evaluation system: <http://stonybrook.campuslabs.com/courseeval/>