MATH 026: Linear Algebra

Term: 2020 Winter Session Instructor: Staff Language of Instruction: English Classroom: TBA Office Hours: TBA
Class Sessions Per Week: 6 Total Weeks: 4 Total Class Sessions: 25 Class Session Length (minutes): 145 Credit Hours: 4

Course Description:

This course addresses matrix algebra and solution of linear systems. Topics covered in this course include: Gaussian elimination, fundamental theory, row-echelon form; Computer methods. Vector spaces, subspaces, bases and linear independence, dimension, column spaces, null spaces, rank and dimension formula; Orthogonality, orthonormal sets, Gram-Schmidt orthogonalization process, least square approximation; Eigenvalues and eigenvectors, diagonalization of matrices, linear transformations, determinants; Diagonalization; The real and complex number fields.

Prerequisite: MATH 021 or equivalent 2nd year calculus course.

Course Materials:

Linear Algebra and Its Applications, David C Lay, 5th edition.

Course Format and Requirements:

This course has 25 class sessions in total. Each class session is 145 minutes in length. Please do not use electronic devices such as phones, iPads, computers, etc. during the lectures.

Attendance

Students are expected to attend and participate in class. Missing class is the most common reason for poor performance in the course. If you miss a class, you are responsible for obtaining notes

for that class from a student who attended. It is also your responsibility to find out about any announcements made in class.

Grading Scale:

A+: 98%-100%
A: 93%-97%
A-: 90%-92%
B+: 88%-89%
B: 83%-87%
B-: 80%-82%
C+: 78%-79%
C: 73%-77%
C-: 70%-72%
D+: 68%-69%
D: 63%-67%
D-: 60%-62%
F: Below 60%

Course Assignments:

Quizzes

There will be 6 quizzes administered through the whole semester. Quizzes will always be completed in the first ten minutes of class. The quiz problems will be similar to homework problems and in-class examples. There will be no make-up quizzes.

Midterm Exams

There will be two midterm exams in this course. The midterm exam will be based on concepts covered in class. It will be in-class, close-book and non-cumulative.

Final Exam

The final will be cumulative and close-book. Note that the final will not be taken during the normal class times. Exact time and location for final will be announced later.

Course Assessment:

Quizzes	15%

Midterm Exams 1	25%
Midterm Exams 2	25%
Final Exam	35%
Total	**100%**

Course Schedule:

Week 1- Class 1	Week 1- Class 2
Introduction to course Go through Syllabus Review on calculus, trigonometry and algebra	Systems of linear equations Matrix of a system
Week 1- Class 3	Week 1- Class 4
Elementary row operations Row echelon form	***Quiz 1*** Gaussian elimination Matrix algebra
Week 1- Class 5	Week 1- Class 6
Matrix multiplication Properties of Matrix multiplication	***Quiz 2*** Elementary matrices Determinant of a matrix
Week 2- Class 7	Week 2- Class 8
Properties of determinants Computing determinants using Gaussian elimination	Computing determinants using Gaussian elimination (Cont.) Review for Midterm 1
Week 2- Class 9	Week 2- Class 10
Midterm exam 1	Vector spaces Subspaces
Week 2- Class 11	Week 2- Class 12
Linear independence Basis and dimension	Change of basis Transition matrix

Week 3- Class 13	Week 3- Class 14
Quiz 3 Row space and column space Applications to systems of linear equations	Linear transformations Dentitions and examples
Week 3- Class 15	Week 3- Class 16
Quiz 4 Image and Kernel Matrix representations of linear transformations	Similarity, changes of basis for a linear transformation Orthogonality
Week 3- Class 17	Week 3- Class 18
Quiz 5 Orthogonal Projections: The scalar product in R^n Inner product spaces	Orthogonal Projections: Orthonormal sets Review for Midterm 2
Week 4- Class 19	Week 4- Class 20
Midterm exam 2	The Gram-Schmidt orthogonalization process Eigenvalues and eigenvectors
Week 4- Class 21	Week 4- Class 22
Diagonalization Exponent of a matrix	Exponent of a matrix(cont.) Orthogonal polynomials
Week 4- Class 23	Week 4- Class 24
Quiz 6 Dynamical Systems Complex Eigenvalues	Trigonometric polynomials Fourier transform
Week 4- Class 25	***Final Exam (Cumulative): TBA***
Summary of Course Review for Final	

Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Shanghai Normal University's *Academic Conduct Code*. Any work suspected of violating the standards of the *Academic Conduct Code* will be reported to the Dean's Office. Penalties for violating the *Academic Conduct Code* may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the *Academic Conduct Code*.

Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.