MATH 2160: Linear Algebra

2022 Winter Session	
Total Class Sessions: 25 **Class Sessions Per Week: 6** **Total Weeks: 4** **Class Session Length (Minutes): 145** **Credit Hours: 4**	**Instructor: Staff** **Classroom: TBA** **Office Hours: TBA** **Language: English**

Course Description:

This course introduces students to matrix algebra and solution of linear systems. Topics 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 1220 or equivalent 2nd year calculus course.

Course Materials:

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

Course Format and Requirements:

The in-class environment should be conducive to learning by all. Please keep chit-chat to a minimum, cell phones turned off, etc. If your behavior is disrespectful to your classmates, you will be asked to leave.

Course Assignments:

Quizzes:

There will be 6 quizzes. The lowest score will be dropped. 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.

Exams:

Midterm Exams

There will be three midterm exams in this course. The midterm exams will be based on concepts covered in class. They 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 (5 out of 6)	15%
Midterm Exams 1	20%
Midterm Exams 2	20%
Midterm Exams 3	20%
Final Exam	25%
Total	**100%**

Grading Scale (percentage):

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

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 Chengdu University of Technology'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.

Course Schedule:

Class 1:
Introduction to course
Go through Syllabus
Review on calculus, trigonometry and algebra

Class 2:
Systems of linear equations
Matrix of a system

Class 3:
Elementary row operations
Row echelon form

Class 4:
Quiz 1
Gaussian elimination
Matrix algebra

Class 5:
Matrix multiplication
Properties of Matrix multiplication

Class 6:
Quiz 2
Elementary matrices
Determinant of a matrix

Class 7:
Determinant of a matrix (Cont.)
Review for Midterm 1

Class 8:
Midterm 1

Class 9:
Properties of determinants
Computing determinants using Gaussian elimination

Class 10:
Quiz 3
Computing determinants using Gaussian elimination (Cont.)
Vector spaces
Subspaces

Class 11:
Subspaces
Linear independence

Class 12:
Quiz 4
Linear independence (Cont.)
Basis and dimension
Change of basis

Class 13:
Change of basis (Cont.)
Transition matrix
Review for Midterm 2

Class 14:
Midterm 2

Class 15:
Row space and column space
Applications to systems of linear equations

Class 16:
Linear transformations
Dentitions and examples
Image and Kernel

Class 17:
Quiz 5
Matrix representations of linear transformations
Similarity, changes of basis for a linear transformation

Class 18:
Orthogonality
Orthogonal Projections：
The scalar product in R^n
Inner product spaces

Class 19:
Orthogonal Projections：
Orthonormal sets
The Gram-Schmidt orthogonalization process
Review for Midterm 3

Class 20:
Midterm exam 3

Class 21:
Eigenvalues and eigenvectors
Diagonalization

Class 22:
Diagonalization (cont.)
Exponent of a matrix

Class 23:
Quiz 6
Orthogonal polynomials
Dynamical Systems

Class 24:
Complex Eigenvalues
Trigonometric polynomials

Class 25:
Fourier transform
Review for FINAL

Final Exam (Cumulative): TBA