MATH 3685: Introduction to Applied Linear Algebra

2023 Summer Session	
Total Class Sessions: 25 **Class Sessions Per Week: 5** **Total Weeks: 5** **Class Session Length (Minutes): 145** **Credit Hours: 4**	**Instructor: Staff** **Classroom: TBA** **Office Hours: TBA** **Language: English**

Course Description:

Linear Algebra is widely used in the field of science, engineering and data analysis(e.g. Google's search algorithm).The goal of this course is providing students with enough linear algebra knowledge for understanding of models, methods and theory, and applying to other areas with computational aspects related to real life situations. Topics will cover the following from textbook: 1. Matrices and Gaussian elimination; 2.Vector Spaces; 3. Orthogonality; 4. Determinants; 5. Eigenvalues and eigenvectors; 6.Positive definite matrices.

Upon completion, the students are expected to not only have a good understanding on the basic linear algebra knowledge and its applications, but also develop more rigorous mathematical techniques.

Course Materials:

Textbook:

Linear Algebra and Its Applications, 4th Edition

Author: Gilbert Strang

Publisher: Cengage Learning; 4th edition (2006)

Language: English

ISBN-10: 0030105676

ISBN-13: 978-0030105678

Course Assignments:

Quizzes: There will be 6 unannounced quizzes. Each student will be allowed to drop one and only one quiz grade, which may be a missed quiz or the lowest quiz grade. These quizzes will be designed based on materials covered in lectures, classroom discussions, and homework.
Homework: There will be 5 homework assignments based on the material presented in the lectures. Practice through homework problems is an important part of the course. Discussion of homework

problems with your classmates is encouraged, but all assignments must be completed individually. Late homework will receive a maximum of 60% of its grade.

Exams:

The exams will be closed book and closed notes. There will be two midterms and one cumulated final exam. Each exam will take 2 hours. A non-programmable calculator and one A4-sized page of formula sheet can be used during the exam.

Course Assessment:

Homework	10%
Quizzes	15%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Exam	35%
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:

Week	Topics	Activities
Week 1 (Class 1- 5)	**Course syllabus and Course Introduction** **Chapter 1: Matrices and Gaussian Eliminations** The Geometry of Linear Equations An Example of Gaussian Elimination Matrix Notation and Matrix Multiplication Triangular Factors and Row Exchanges Inverses and Transposes Special Matrices and Applications **Chapter 2: Vector Spaces** Vector Spaces and Subspace Solving Ax=b	Quiz 1 Homework
Week 2 (Class 6- 10)	**Chapter 2: Vector Spaces** Linear Independence, Basis, and Dimension The Four Fundamental Subspaces Graphs and Networks Linear Transformations **Chapter 3: Orthogonality** Orthogonal Vectors and Subspace Cosines and Projections onto Lines	Quiz 2 Homework Midterm Exam 1
Week 3 (Class 11- 15)	**Chapter 3: Orthogonality** Projections and Least Squares Orthogonal Bases and Gram-Schmidt The Fast Fourier Transform **Chapter 4: Determinants** Properties of the Determinant Formulas for the Determinant Applications of Determinants	Quizzes 3 & 4 Homework
Week 4	**Chapter 5: Eigenvalues and Eigenvectors**	Quiz 5

(Class 16- 20)	Diagonalization of a Matrix Difference Equations and Powers Ak Differential Equations and eAt Complex Matrices Similarity Transformations , Jordan Form	Homework Midterm Exam 2
Week 5 (Class 21- 25)	**Chapter 6: Positive Definite Matrices** Minima, Maxima, and Saddle Points Tests for Positive Definiteness Singular Value Decomposition Minimum Principles Matrix Norm and Condition Numbers **Review for Final exam**	Quiz 6 Homework Final Exam