HANYANG UNIVERSITY

Hanyang International Summer School

Faculty Information	**Name**	Linear Algebra and Its Applications				
	E-mail	jwbae@hanyang.ac.kr				
	Home University	Hanyang University				
	Department	School of Mechanical Engineering				
	Homepage	www.cleslab.com				
Course Information	**Class No.**	18059	**Course Code**	DME2060	**Credits**	3
	Course Name	Linear Algebra and Its Applications				
	Lecture Schedule	Tue-Fri / 1:00 PM - 4:00 PM				
	Course Description	Modern engineering problems use computer simulation techniques as solutions, and most of these computational solvers are based on linear algebra. Linear algebra provides a systematic solution along with a theoretical understanding of the system composed by linear equations, which can be directly connected to computational solvers. Therefore, linear algebra is essential in order to efficiently and quickly solve engineering problems dealing with large-scale unknown variables using computers. Therefore, this lecture will provide the concepts of linear equations and their solutions, properties of matrices and vectors, linear independence (or linear independence, basis, eigenvalue and eigenvector. Based on these fundamentals, its applications for artificial intelligence and machine learning will be also covered in this class.				
	Course Objective	1. Concepts of linear equations and their solutions 2. Properties of matrices and vectors 3. Linear independence and basis 4. Eigenvalue and eigenvector 5. Singular Value Decomposition 6. Understanding applications for AI				
	Prerequisite	-				
	Materials/Textbooks	Linear algebra and its applications (4th edition), Gilbert Strang				
Evaluation	**Attendance**	10%	**Quiz**	%		
	Assignment	10%	**Mid-term Exam**	40%		
	Presentation	%	**Final Exam**	40%		
	Group Project	%	**Participation**	%		
	Etc.	**Evaluation Item**		**Ratio**		
				%		
				%		

Daily Lecture Plan	**Week 1**	Day 1	1.1 Linearity and Linear Algebra
		Day 2	1.2-1.4 Matrices and Gaussian Elimination 1.5 Triangular Factors and Row Exchanges
		Day 3	1.6 Inverse and Transposes 2.1 Vector Spaces and Subspaces
		Day 4	2.2 Solving Ax = 0 and Ax = b 2.3 Linear Independence, Basis, and Dimension
	Week 2	Day 1	2.4 The Four Fundamental Subspaces 2.5-2.6 Linear Transformations
		Day 2	3.1 Orthogonal Vectors and Subspaces 3.2-3.3 Projections and Least Squares
		Day 3	3.4(1) Orthogonal Bases and Gram-Schimidt 3.4(2) QR Factorization
		Day 4	Mid-term exam
	Week 3	Day 1	4.1 Introduction to Determinants 4.2 Properties of Determinant
		Day 2	4.3 Formulas for the Determinant 4.4 Applications of Determinants
		Day 3	5.1 Eigenvalues and Eigenvectors 5.2 Diagonalization of a Matrix
		Day 4	5.3 Difference Equations and Powers A^k 5.4 Differential Equations and e^At
	Week 4	Day 1	5.5 Complex Matrices
		Day 2	6.3 Singular Value Decomposition
		Day 3	Final exam
		Day 4	Graduation (NO class)