Mathematics 4

Basic Course Information

Course Number	02005012	Subject Category	Compulsory(G)
Class Format	Lecture	Credit Type and Number of Credits	2.5
Department	Computer	Student Category	Year 2
Period of Study	Semester 2	Classes per Week	5
Required Materials	"Elementary Linear Algebra" by Howard Anton and Chris Rorres, "Mathematics Volume 2-Linear Algebra-" by Ikawa et al.		
Instructor	Natthawut Bunlue	Dawan Chumpungam	

Course Objective

When successfully complete this course, students will be able to :
1. Deal with matrices to solve linear systems or describe transformations by applying matrix operations
2. Understand the definition of the determinant, eigenvalue and eigenvector, and apply them to solve problems

Evaluation(Rubric)	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
Evaluation 1: Matrix Operations	Be able to apply elementary row operations and solve linear systems or find the inverse matrix for large-size matrices	Be able to apply elementary row operations and solve linear systems or find the inverse matrix for small-size matrices	Can not apply elementary row operations to solve linear systems or find inverse matrix
Evaluation 2: Determinants	Understand the definition, properties and meanings of the determinant of a matrix, and find the value of determinant for large-size matrices	Understand the definition, properties and meanings of the determinant of a matrix, and find the value of determinant for small-size matrices	Can not calculate the determinant
Evaluation 3: Matrix Transformations	Be able to represent matrix transformations by matrices and explain the geometrical meaning	Be able to represent matrix transformations by matrices	Can not represent matrix transformations by matrices
Evaluation 4: Eigenvalues and Eigenvectors	Be able to explain the definition and find the eigenvalues and eigenvectors. Diagonalize any symmetric matrix by a diagonal matrix	Be able to explain the definition, find the eigenvalues and eigenvectors and diagonalize a matrix	Can not find the eigenvalues or eigenvectors

Relationship with Learning Outcomes

G(1) Wide knowledge on Science and Engineering and practical ability to apply them to solve problems in the society.

G(4) Creativity to make a new value with fusing the knowledge from various fields.

Please change

Teaching Method

Outline:	
Class Format:	Lecture, Drill, Group Work, Presentation
Please Note :	Class format is subjectd to change depending on students' prior knowledge and preparation

Course Plan

Semester 2	Contents and Method of Course	Goals	Related MCC		
			I	1	45
1st Week	Chapter 1 : Matrices and Matrix Operations	Can perform matrix operations on addition, subtraction, scalar multiplication and matrix multiplication			
2nd Week	Chapter 1 : Elementary Row Operations for Solving Linear Systems	Can solve linear systems by elementary row operations			
			I	1	46
			I	1	47
3rd Week	Chapter 1 : Elementary Row Operations for Finding Inverse Matrices Chapter 2 : Determinant of 2×2 and 3×3 Matrices	Can find inverse matrices by elementary row operations. Can find the value of determinant for any square matrix			
			I	1	47
4th Week	Chapter 2 : Definition of the Determinant and Its Properties **1st Quarter Examination (15%)**	Can explain the definition of determinant and apply properties to find the value of determinant			
			I	1	47
5th Week	Chapter 2 : Properties of Determinants	Can apply properties to find the value of determinant			
			I	1	46
6th Week	Chapter 2 : Finding Inverse Matrices Chapter 3 : Euclidean Vector Spaces	Can find inverse matrices by adjoint matrices. Can explain the definition of Euclidean vector space and calculate norms.			
7th Week	Chapter 3 : Othogonal Projection, Cross Product and Geometrical Meaning of Determinants	Can find the area of a parallelogram and the volume of a parallelepiped by determinants.			
8th Week	Chapter 3 : Cramer's Rule	Can solve linear systems by Cramer's rule.			
9th Week	**Midterm Examination (20%)**				
10th Week	Chapter 4 : Definition of Basis	Can explain the definition of basis and describe the relation between basis and coordinates			
			I	1	48
11th Week	Chapter 4 : Change of basis, Linear Transformations and Matrix Transformations	Can find the change-of-basis matrix, Can identify a linear transformation and the relevance of linear transformation and matrix transformation.			
12th Week	Chapter 4 : Subspaces and Basis for R(T)	Can explain the definition of subspace. Can find the basis for the range of any linear transformation by performing elementary row operations.			
			I	1	49
13th Week	Chapter 4 : Various Transformations	Can find the composite transformation and the inverse image considering the inverse transformation. Can represent various transformations by matrices.			
			I	1	50
14th Week	Chapter 4 : Various Transformations	Can represent rotations, orthogonal transformations and various transformations by matrices.			
15th Week	Chapter 5 : Definition of Eigenvalue and Eigenvector **3rd Quarter Examination (20%)**	Can explain the definition of eigenvalues and eigenvectors			
16th Week	Chapter 5 : Diagonalization and Othogonal Matrices	Can diagonalize square matrices and identify an orthogonal matrix			
17th Week	Chapter 5 : Orthogonal Diagonalization and Quadratic form	Can diagonalize a symmetric matrix by an orthogonal matrix and can find the diagonal form of a quadratic form by diagonalization.			
18th Week	**Review Session**				
19th Week	**Final Examination (20%)**				
20th Week	**Return Answer-Sheets Review Semester and Feedbacks**				

Do not

	Examination	Drill Submission	Class Participation / Behavior
Basic Ability	75	15	10
Technical Ability	0	0	0
Interdisciplinary Ability	0	0	0