Applied Mathematics 3

Basic Course Information

Course Number	01005017	**Subject Category**	Compulsory(G)
Class Format	Lecture	**Credit Type and Number of Credits**	1
Department	Mechatronics	**Student Category**	Year 4
Period of Study	Semester 1	**Classes per Week**	2
Required Materials	"Mathematics 2(Linear Algebra)" by O. Ikawa et. al., "Linear Algebra" by Jim Hefferon, "Elementary Linear Algebra" by Howard Anton and Chris Rorres		
Instructor	Akinori Tanaka		

Course Objective

When successfully complete this course, students will be able to.
1. Understand and explain the concepts of a vector space and a linear transformation.
2. Find a basis and the dimension of a given vector space to understand the structure of a vector space.
3. Find the change of basis matrices and the representation matrices for given bases and linear transformations, and describe their relationship.

Evaluation(Rubric)	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
Evaluation 1	Can describe the definition and give examples of a vector space and a linear transformation.	Can determine a vector space and a linear transformation according to the definition.	Cannot describe the definition or cannot determine a vector space or a linear transformation.
Evaluation 2	Can find a basis and the dimension of a given subspace of a vector space and explain it.	Can determine whether a given set is a basis of the subspace.	Cannot determine whether a given set of vectors is a basis of the subspace.
Evaluation 3	Can find the change of basis matrices and representation matrices for given bases and a linear transformation, and describe their relationship.	Can find the change of basis matrix of given bases and the representation matrix of a given linear transformation.	Cannot find the change of basis matrix of given bases or the change of basis matrix of given bases, and can find the representation matrix of a given linear transformation.

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:	Lecture, Drill, Presentation
Class Format:	
Please Note :	

Course Plan

Semester 1	Contents and Method of Course	Goals	Related MCC		
1st week	Review on basic linear algebra, Set and mapping	Can recall basic concepts on linear algebra learned in Mathematics 4. Can describe sets and maps with their notations, and determine injective, surjective or bijective			
2nd week	Vector space	Can give examples of vector spaces and explain that they satisfy the conditions.	1	1	40
3rd week	Linear mapping	Can give examples of linear mapping and explain that they satisfy the conditions. Understand the concepts of isomorphism.	1	1	48
			1	1	49
4th week	Linear dependence/independence	Can determine whether given vectors are linearly independent or not and explain it.			
5th week	Basis and dimension	Can find a basis and the dimension for various vector spaces.			
6th week	no class				
7th week	Subspace	Can explain the definition of subspace and give some examples.	1	1	41
8th week	Review session	Week 1-7			
9th week	Midterm examination	Week 1-8			
10th week	Kernel and image	Can find the kernel and image for given linear mapping. Can show that the kernel and image are subspaces.	1	1	45
			1	1	9
11th week	Dimension of subspace, Formula on dimensions	Can find the kernel and image for given linear mapping. Can show that the kernel and image are subspaces.			
12th week	no class	Can show some properties on dimension of subspaces. Can derive and use formulae on dimentions.			
13th week	Inner product space	Understand inner product and inner product space.	1	1	43
14th week	Orthonormal basis	Can find an orthonormal basis of a numerical vector space using Gram-Schmidt orthonormalization.			
15th week	Review session	Week 10-14			
16th week	Representation matrix	Can find the representation matrices of a linear mapping with some bases.	1	1	48
			1	1	49
17th week	Change of basis matrices	Can find the change of basis matrix for given bases.	1	1	45
			1	1	46
18th week	Review session	Week 10-17			
19th week	Final examination	Week 10-18			
20th week	Return answer-sheets, Review semester and feedback	Summary			

Do not

	Examination	Class participation	Drill submission
Basic Ability	70	10	20
Technical Ability			
Interdisciplinary Ability			