

## Linear Algebra2

Course Name	Course type (credit/hours)	Required course(4/5)			Course code	G022
	Target students Division/major/grade	Mathematics/Sophomore			Opening semester	2017 2ND SEMESTER
	Class time and classroom	Wed 10:30~12:00 (Pal311)Thu 8.5(Pal311)Thu 9.5(Pal311)Fri 10:30~12:00 (Pal311)			English Grade	A(100%English)
Reference to this course	Prerequisite courses	선형대수1				
	Related basic courses					
	Recommended concurrent courses					
	Related advanced courses	수치해석(Numerical Analysis), 현대대수(Morden Algebra)				
Instructor	Name (title/division)	Park, Boram(Assistant Professor, Mathematics)				
	Office Room Number	팔달관 613호	Office phone Number	2561	e-mail	
	Office hours				Homepage address	
Teaching Assistant	Name (title/division)					
	Office Room Number		Office phone Number		e-mail	

### 1. Introduction

This course is a continuation of Linear Algebra 1.

The topics include orthogonality, vector space, inner space, norm, and singular value decomposition.

We deal with basic concepts, examples and applications.

Linear algebra is one of the basic subjects in mathematics due to its wide applications to science, engineering, and even social sciences.

The aim of this course is to provide complete and logical understanding of the concepts and examples so that students can master the related computational skills.

### 2. Course Objectives

1. orthogonality, orthogonal projection, the gram-schmidt process, QR factorization, graphing quadratic equations
2. general vector space, subspace, base, dimensions, changing bases
3. linear transformation, kernal, range, matrix representations
4. inner product, norm
5. applications including error correcting codes

### 3. Class types and activities

This course consists of lectures and problem-solving.

### 4. Teaching Method

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> lecture                          | <input type="checkbox"/> discussion and debate              |
| <input type="checkbox"/> team project(presentation and case studies) | <input type="checkbox"/> experiments(role-playing,etc)      |
| <input type="checkbox"/> designing and production                    | <input type="checkbox"/> on-site learning(on-site training) |
| <input type="checkbox"/> others                                      |   |

### 5. Support Systems in Use

- |  |   |   |
|--|---|---|
| <input checked="" type="checkbox"/> e-class / AjouBb     | <input type="checkbox"/> automatic recording system | <input type="checkbox"/> web-based assignment |
| <input type="checkbox"/> cyber lecture                   | <input type="checkbox"/> online content             |   |
| <input type="checkbox"/> class behavior analyzing system | <input type="checkbox"/> others                     |   |

### 6. Teaching Tools

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|---|---|---|
| <input checked="" type="checkbox"/> PBL(Problem Based Learning) | <input type="checkbox"/> CBL(Case Based Learning) | <input type="checkbox"/> TBL(Team Based Learning)           |
| <input type="checkbox"/> UR(Undergraduate Research)             | <input type="checkbox"/> FL(Flipped Learning)     | <input type="checkbox"/> DSAL(Data Science Active Learning) |
| <input type="checkbox"/> others                                 |   |   |

### 7. Knowledge and ability required for taking this course

Prerequisite: Linear Algebra 1(understanding of  $R^n$  as in Linear Algebra 1)  
Maple and Matlab are helpful to understand the examples

## 8. Method of Evaluation

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance		5%	
midterm exam	1	30%	
final exam	1	40%	
quiz	2-3	15%	
presentation			
discussion			
homework	2-3	10%	
etc			
study hours			

## 9. Textbook and supplementary material

Main/Sub	Title (Web-site)	Writer	Publisher	Publication year
Sub	Elementary Linear Algebra	Anton & Rorres	John Wiley	1994
Main	Linear Algebra – A modern introduction 3rd edition	David Poole	Brooks/Cole	2010
Sub	Linear Algebra with Applications, 7th ed.	Steven J. Leon	Prentice Hall	2006

## 10. Class system and Class shedule

<p>Orthogonality of vectors → Gram–Schmidt Process and QR factorization → quadratic form          Vector space, subspace and base → change of bases → linear transformation → application to differential equations          Inner product → distance → least squares approximation → singular value decomposition.</p>
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### < Class Schedule >

\* language : K–korean, E–English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
1	§5.1 Orthogonality		Park, Boram	Lecture and problem solving		
2	§5.2 Orthogonal complements and Orthogonal Projections		Park, Boram	Lecture and problem solving		
3	§5.3 The Gram–Schmidt Process and the QR factorization		Park, Boram	Lecture and problem solving		

< Class Schedule >

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Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
4	§5.4 Orthogonal Diagonalization of Symmetric Matrices		Park, Boram	Lecture and problem solving		
5	§5.5 Dual Code, Quadratic forms,		Park, Boram	Lecture and problem solving		
6	§6.2 Subspace, basis, and dimension		Park, Boram	Lecture and problem solving		
7	§6.3 Change of basis		Park, Boram	Lecture and problem solving		
8	Midterm examination		Park, Boram	Test		
9	§6.4 & 5 Linear transformation and its Kernel and range		Park, Boram	Lecture and problem solving		
10	§6.6 The matrix of linear transformation		Park, Boram	Lecture and problem solving		
11	§6.7 Homogeneous differential equations, Linear Code,		Park, Boram	Lecture and problem solving		
12	§7.2 Norms and Distance functions		Park, Boram	Lecture and problem solving		
13	§7.3 Least squares Approximation		Park, Boram	Lecture and problem solving		
14	§7.4 The singular value decomposition		Park, Boram	Lecture and problem solving		
15	§7.5 Error-Correcting codes		Park, Boram	Lecture and problem solving		
16	Final examination		Park, Boram	Test		

11. Other items of notification