

# ALGEBRA SERIES: LINEAR ALGEBRA

(MATS3250)

## Introduction

A series of Algebra programmes offered by the **Department of Mathematics, the University of Hong Kong**, are designated for Maths lovers to learn Algebra progressively.

The **Algebra Series** consists of the following programmes:

Programme	Code	Application	Programme held
Matrices and Determinants	MATS3230	Jul-18	Oct 2018
Vectors	MATS3320	Oct-18	Dec 2018
Matrices and Equations	MATS3240	Jan-19	Mar 2019
Linear Algebra	MATS3250	Apr-19	Jun - Jul 2019

Here comes the last programme in the **Algebra Series**, Linear Algebra in which the level of difficulty reaches the undergraduate university level.

Linear algebra is central to almost all areas of mathematics. It is also widely regarded as a stepping stone into advanced mathematics. By studying linear equations and linear functions, the structure of vector spaces is constructed and the corresponding theories are established. The subject finds a wide variety of applications such as in physics, engineering, computer science, economics and finance.

## Programme Type / Level

Algebra Course (Level 5) ([Token-required](#))

## Instructor(s)

Dr. Ching Tak Wing

## Pre-requisites

Student should have basic knowledge in:

- Basic operations on vectors
- Basic operations on matrices
- Solving systems of linear equations

## Target Participants



- S1 – S6 HKAGE student members
- Class size: 20

All applicants **MUST** attend the screening test held in **May 2019** in **HKU** except those who have passed **ALL** “Matrices and Determinants (MATS3230)”, “Vectors (MATS3320)” and “Matrices and Equations (MATS3240)”.

Priority will be given to student members who have passed **ALL** MATS3230, MATS3320 and MATS3240. They could have direct admission to this programme when apply.

## Medium of Instruction



English with English handouts

## Certificate



**E-Certificate** will be awarded to participants who have:

- ❖ Attending **AT LEAST 6** sessions AND
- ❖ Satisfactory performance in both assignments and assessments

## Intended Learning Outcomes



- Upon completion of the programme, participants should be able to:
1. state and prove various properties of matrix and vector operations including addition, scalar multiplication, transposition and multiplication;
  2. state and prove equivalent conditions for invertible matrices, including those related to rank and determinant;
  3. identify linear transformations and find their standard matrices;
  4. determine whether a set is a vector space, and find its dimension when it is;
  5. find eigenvalues and eigenvectors of a matrix, and diagonalise the matrix when possible.

## Application Deadline

**29 Apr 2019, 12:00 n.n**

## Application Result Release Date

**17 May 2019**

If student members withdraw from the programme after the Application Deadline, the token will be deducted.

## Schedule (Tentative)



Session	Date	Time	Venue	Content
	11 May	10:00 a.m. – 12:00 n.n.	G05, James Hsioung Lee Science Building HKU	Screening Test
1	1 Jun	2:00 p.m. – 5:00 p.m.	HKU Campus	Review of Matrices, Vectors and Systems of Linear Equations
2	8 Jun			Concepts of Span and Linear Dependence
3	15 Jun			Linear Transformations
4	22 Jun			Mid-term Quiz and Discussions
5	29 Jun			Introduction to Vector Spaces
6	6 Jul			Eigenvalues and Eigenvectors
7	13 Jul			Further Applications of Linear Algebra
8	20 Jul			Test and Discussions

### Remarks:

**For any assessment to be held in the programme, no make-up will be arranged, including Screening Test.**

[MAP](#)

## Sample Examples for the Programme

1. Compute  $\begin{pmatrix} 2 & 3 \\ 2 & 1 \end{pmatrix}^n$  where  $n$  is a positive integer.
2. Prove the Cayley-Hamilton theorem.

## Enquiries



For enquiries, please contact us at 3940 0101 after language selection, press "1".