香 港 資 優 教 育 學 苑
The Hong Kong Academy for Gifted Education

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 2019**	**Oct 2019**
Vectors	**MATS3320**	**Oct 2019**	**Dec 2019**
Matrices and Equations	**MATS3240**	**Jan 2020**	**Mar 2020**
Linear Algebra	**MATS3250**	**Apr 2020**	**Jun - Jul 2020**

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 on **23 May 2020** in the **HKAGE** 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:
- Attended **AT LEAST 6** sessions AND
- Had 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

~~18~~ 19 May 2020 12:00 n.n.

Application Result Release Date

~~29~~ 19 May 2020

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

Schedule (Tentative)

Session	Date	Time	Venue	Content
	~~23 May~~	~~3:00 p.m. – 4:00 p.m.~~	~~HKAGE Room 105~~	~~Screening Test~~
1	~~6 Jun~~ 13 Jun	2:00 p.m. – 5:00 p.m.	RR210 HKU	Review of Matrices, Vectors and Systems of Linear Equations
2	20 Jun			Concepts of Span and Linear Dependence
3	27 Jun			Linear Transformations
4	4 Jul			Mid-term Quiz and Discussions
5	11 Jul		Online teaching	Introduction to Vector Spaces
6	18 Jul			Eigenvalues and Eigenvectors
7	25 Jul			Further Applications of Linear Algebra
8	28 Jul			Test and Discussions

Remarks:

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

RR: Run Run Shaw Building

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”.