

MA2158: LINEAR ALGEBRA AND CALCULUS

Effective Term

Semester A 2024/25

Part I Course Overview

Course Title

Linear Algebra and Calculus

Subject Code

MA - Mathematics

Course Number

2158

Academic Unit

Mathematics (MA)

College/School

College of Science (SI)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

MA1201 Calculus and Basic Linear Algebra II / MA1301 Enhanced Calculus and Linear Algebra II; or equivalent

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

MA2001 Multi-variable Calculus and Linear Algebra

Part II Course Details

Abstract

This course aims to develop mathematical concepts and techniques in advanced linear algebra, multi-variable calculus and Fourier series as well as their applications in science and engineering. It provides students skills and the ability to think quantitatively and analyse problems critically.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	explain at high levels concepts from advanced linear algebra	10			x
2	compute eigenvalues and eigenvectors of matrices	20		x	
3	evaluate multiple integrals of multivariate functions	20		x	
4	solve first and second order ordinary differential equations	20		x	
5	apply mathematical and computational methods to a range of application problems involving advanced linear algebra, ordinary differential equations and multi-variable calculus	20	x	x	x
6	the combination of CILOs 1-5	10	x	x	x

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Learning through teaching is primarily based on lectures.	1, 2, 3, 4, 5, 6	39 hours in total
2	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	2	4 hours
3	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	3	4 hours

4	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	1, 5	3 hours
5	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	4	2 hours
6	Assignments	Learning through take-home assignments helps students understand basic concepts and techniques of advanced linear algebra, ordinary differential equations and multi-variable calculus, and some applications in science and engineering.	1, 2, 3, 4, 5	after-class
7	Online applications	Learning through online examples for applications helps students apply mathematical and computational methods to some problems in applications.	5	after-class
8	Math Help Centre	Learning activities in Math Help Centre provides students extra help.	2, 3, 4	after-class

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quizzes/Test/Midterm	2, 3, 4, 6	30	Questions are designed for the first part of the course to see how well the students have learned concepts and techniques of advanced linear algebra and ordinary differential equations.

2	Hand-in assignments	1, 2, 3, 4, 5, 6	0	These are skills based assessment to see whether the students are familiar with advanced concepts and techniques of linear algebra, ordinary differential equations, multi-variable calculus and Fourier series and some applications in science and engineering.
3	Formative take-home assignments	1, 2, 3, 4, 5, 6	0	The assignments provide students chances to demonstrate their achievements on linear algebra, ordinary differential equations and multi-variable calculus learned in this course.

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

2

Additional Information for ATs

30% Coursework

70% Examination (Duration: 2 hours, at the end of the semester)

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)**Assessment Task**

1. Quizzes/Test/Midterm

Criterion

Ability to apply and explain the concepts, methodology and procedure

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

2. Hand-in assignments

Criterion

Ability to apply and explain the concepts, methodology and procedure

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

3. Formative take-home assignments

Criterion

Ability to apply the methodology and procedure for analysing real life problems

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

4. Examination

Criterion

Ability to apply and explain the concepts, methodology and procedure

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Eigenvalues and eigenvectors. First-and second-order ordinary differential equations and applications. Multiple integration. Fourier series.

Reading List**Compulsory Readings**

Title	
1	For further detailed information, please refer to https://www.cityu.edu.hk/ma/programmes/undergraduate/non-BSCM-students/topics-recommended-readings-servicing-courses#heading9

Additional Readings

Title	
1	Nil