MA1201: CALCULUS AND BASIC LINEAR ALGEBRA II

Effective Term
Semester A 2024/25

Part I Course Overview

Course Title
Calculus and Basic Linear Algebra II

Subject Code
MA - Mathematics
Course Number
1201

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
(i) MA1200 Calculus and Basic Linear Algebra I, or
(ii) MA1300 Enhanced Calculus and Linear Algebra I

Precursors
Nil

Equivalent Courses
MA1301 Enhanced Calculus and Linear Algebra II

Exclusive Courses
MA1006 Calculus and Linear Algebra for Business
MA1508 Calculus

Part II Course Details

Abstract

This is the second of two required courses designed for students pursuing studies in engineering or science. The course aims to

- develop fluency in concepts and techniques from **integral calculus, linear algebra and complex numbers**, and
- provide students with mathematical training for all further study in science/engineering and its applications.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	perform techniques of integration to evaluate integrals of functions.	24		x	
2	explain clearly concepts from vector and matrix algebra.	8	x		
3	manipulate expressions and solve geometric problems with vector arithmetic.	15			x
4	implement techniques of matrix arithmetic and of solving systems of linear equations.	23		x	
5	perform basic operations and solve equations involving complex numbers.	15		x	
6	apply methods of integral calculus, linear algebra and complex numbers to model problems in science and engineering.	15	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 (A/B);46 hours in total (C/D)
2	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	1	3 hours in total (A/B);4 hours in total (C/D)

3	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	2, 3	3 hours in total (A/B);4 hours in total (C/D)
4	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	2, 4	3 hours in total (A/B);4 hours in total (C/D)
5	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	5	2 hours in total (A/B);4 hours in total (C/D)
6	Tutorials	Learning through tutorials is primarily based on interactive problem solving allowing instant feedback.	6	2 hours in total (A/B);3 hours in total (C/D)
7	Assignments	Learning through take-home assignments helps students implement concepts and methods of integral calculus, linear algebra and complex numbers, as well as apply knowledge of which to problems in science and engineering.	1, 2, 3, 4, 5, 6	after class
8	Online applications	Learning through online examples for applications helps students apply methods of integral calculus, linear algebra and complex numbers to problems in science and engineering.	6	after class
9	Math Help Centre	Learning activities in Math Help Centre provides students extra assistance in study.	1, 2, 3, 4, 5, 6	after-class,depending on need

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quizzes/Test/Midterm	1, 2, 3, 4, 5, 6	15	Questions are designed to see how well students have learned techniques of integral calculus, as well as concepts and arithmetic of linear algebra and complex numbers. These assessment tasks monitor students' progress and reveal gaps in knowledge.
2	Hand-in assignment(s)	1, 2, 3, 4, 5, 6	15	These are skills based assessment to see whether students are familiar with essential methods and applications of integral calculus, linear algebra and complex numbers.

Continuous Assessment (%)
30

Examination (%)
70

Examination Duration (Hours)
3

Additional Information for ATs
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 use basic skills of integral calculus linear algebra and complex numbers.

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 assignment(s)

Criterion
Ability to apply the methods of integral calculus, linear algebra and complex numbers to physical / engineering applications.

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. Examination

Criterion
Ability to master the mathematical techniques learned in the course.

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
A) Definite and indefinite integrals; Techniques of integration, integration of rational functions, integration by substitution, integration by parts
B) Physical and geometric applications of integration

C) Vectors in R^2 and R^3 ; Scalar products, cross products, triple scalar products; Linear (in)dependence
D) Arithmetic of complex numbers; Polar and Euler forms; De Moivre’ s theorem and its applications
E) Matrices; Determinants, cofactor expansion; Systems of linear equations, Gaussian elimination, Cramer’ s rule; Matrix inverses, Gauss-Jordan elimination method

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#heading3

Additional Readings

	Title
1	Nil