MA1501: COORDINATE GEOMETRY

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Coordinate Geometry

Subject Code
MA - Mathematics
Course Number
1501

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
Nil

Precursors
Nil

Equivalent Courses
GE1358 Coordinate Geometry

Exclusive Courses
Nil

Part II Course Details

Abstract
This course introduces students to coordinate geometry. The content includes curves in two dimensional space, curves in three dimensional space, surfaces in three dimensional space. The emphasis is on developing the concept of coordinate

representation of some basic geometric objects in both two and three dimensional spaces and understanding how to compute some important geometric quantities like distance, normal vector, etc.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain the concepts of points and lines in two-dimensional plane, and explain how to compute the distance between a point and a line, and the angle between two intersecting lines		x	x	
2	Explain the concepts of points, lines and planes in three-dimensional space, and explain how to compute the distance between two non-intersecting lines, the distance between a point and a plane, and the angle between two planes		x	x	
3	Explain the concept of curves based on Cartesian coordinates and polar coordinates in two-dimensional plane, and explain the concept of surfaces based on Cartesian coordinates, cylindrical coordinates and spherical coordinates in three-dimensional space		x	x	
4	Explain the concept of conic sections and describe their features in two-dimensional plane		x	x	
5	Explain the concept of quadric surfaces and describe their features in three-dimensional space		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	Lecture	Students will engage in formal lectures to gain knowledge of topics in coordinate geometry	1, 2, 3, 4, 5	39 hours in total

2	Practice exercises	Students will engage with a series of practice exercises posted on the course website in advance to deepen their knowledge and skills	1, 2, 3, 4, 5	After-class
3	Math Help Centre	Students will receive extra help through learning activities in Math Help Centre	1, 2, 3, 4, 5	After-class

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Quizzes/Test/ Midterm	1, 2	18	Questions are based on curves in both two and three dimensional spaces, and surfaces to assess students' understanding of basic concepts and skills	No
2	Hand-in assignments	3, 4	3	The questions enable students to apply basic concepts and techniques of coordinate geometry to a range of mathematical problems.	Yes
3	Formative take-home assignments	1, 2, 3, 4, 5	9	The assignments provide students chances to demonstrate their achievements on techniques of coordinate geometry learned in this course.	Yes

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

2

Minimum Examination Passing Requirement (%)

30

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 the fundamental concepts and methodology of coordinate geometry to solve a range of mathematical problems

Excellent (A+, A, A-)

Demonstrates a thorough understanding of the concepts and techniques in coordinate geometry and can always apply this understanding to solve a range of mathematical problems

Good (B+, B, B-)

Demonstrate a substantial understanding of the concepts and techniques in coordinate geometry and can usually apply this understanding to solve some mathematical problems

Fair (C+, C, C-)

Demonstrate a general understanding of the concepts and techniques in coordinate geometry and can sometimes apply this understanding to solve some mathematical problems

Marginal (D)

Demonstrate a partial understanding of the concepts and techniques in coordinate geometry and can rarely apply this understanding

Failure (F)

Demonstrate a little understanding or some misunderstanding of the concepts and techniques in coordinate geometry and can rarely or almost never apply this understanding

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Assessment Task

2. Hand-in assignments

Criterion

Ability to understand the basic concepts and techniques of coordinate geometry

Excellent (A+, A, A-)

Demonstrates a thorough understanding of the concepts and techniques in coordinate geometry and can always apply this understanding to solve a range of mathematical problems

Good (B+, B, B-)

Demonstrate a substantial understanding of the concepts and techniques in coordinate geometry and can usually apply this understanding to solve some mathematical problems

Fair (C+, C, C-)

Demonstrate a general understanding of the concepts and techniques in coordinate geometry and can sometimes apply this understanding to solve some mathematical problems

Marginal (D)

Demonstrate a partial understanding of the concepts and techniques in coordinate geometry and can rarely apply this understanding

Failure (F)

Demonstrate a little understanding or some misunderstanding of the concepts and techniques in coordinate geometry and can rarely or almost never apply this understanding

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Assessment Task

3. Formative take-home assignments

Criterion

Ability to demonstrate students' achievements on the methods of coordinate geometry learned in this course

Excellent (A+, A, A-)

Demonstrates a thorough understanding of the concepts and techniques in coordinate geometry and can always apply this understanding to solve a range of mathematical problems

Good (B+, B, B-)

Demonstrate a substantial understanding of the concepts and techniques in coordinate geometry and can usually apply this understanding to solve some mathematical problems

Fair (C+, C, C-)

Demonstrate a general understanding of the concepts and techniques in coordinate geometry and can sometimes apply this understanding to solve some mathematical problems

Marginal (D)

Demonstrate a partial understanding of the concepts and techniques in coordinate geometry and can rarely apply this understanding

Failure (F)

Demonstrate a little understanding or some misunderstanding of the concepts and techniques in coordinate geometry and can rarely or almost never apply this understanding

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Assessment Task

4. Examination

Criterion

Ability to solve problems of curves and surfaces in two and three dimensional space

Excellent (A+, A, A-)

Demonstrates a thorough understanding of the concepts and techniques in coordinate geometry and can always apply this understanding to solve a range of mathematical problems

Good (B+, B, B-)

Demonstrate a substantial understanding of the concepts and techniques in coordinate geometry and can usually apply this understanding to solve some mathematical problems

Fair (C+, C, C-)

Demonstrate a general understanding of the concepts and techniques in coordinate geometry and can sometimes apply this understanding to solve some mathematical problems

Marginal (D)

Demonstrate a partial understanding of the concepts and techniques in coordinate geometry and can rarely apply this understanding

Failure (F)

Demonstrate a little understanding or some misunderstanding of the concepts and techniques in coordinate geometry and can rarely or almost never apply this understanding

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Part III Other Information

Keyword Syllabus

curves, line, circle, ellipse, parabola, hyperbola, polar coordinate, parameterization, intersection between curves, surfaces in three dimensional space, plane, cylinder, sphere, ellipsoid, saddle, cylindrical and spherical coordinates, intersection between surfaces

Reading List

Compulsory Readings

	Title
1	Coordinate Geometry (by Luther Pfahler Eisenhart) Dover Publications (March 4, 2005)

Additional Readings

	Title
1	Nil