

MA1501: COORDINATE GEOMETRY

Effective Term

Semester A 2022/23

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 concept of Cartesian coordinate, polar coordinate, and their usage for two dimensional curves	x	x	
2	Explain the concept of curves based on Cartesian coordinate and parameterization, describe the tangent vector along curves, and explain how to compute distance between two non-intersected straight lines	x	x	x
3	Explain the concept of surface based on Cartesian coordinate, cylindrical and spherical coordinates, describe the normal vector and tangent plane of surfaces, explain the angle between two planes	x	x	x
4	The combination of CILOs 1-3	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.

Teaching and Learning Activities (TLAs)

TLAs	Brief Description	CILO No.	Hours/week (if applicable)	
1	Lecture	Learning through teaching is primarily based on lectures.	1, 2, 3, 4	39 hours in total
2	Take-home assignments	Learning through take-home assignments helps students understand basic concepts and techniques of coordinate geometry.	1, 2, 3, 4	After-class
3	Math Help Centre	Learning activities in Math Help Centre provides students extra help.	1, 2, 3, 4	After-class

Assessment Tasks / Activities (ATs)

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)	
1	Tests	1, 2, 3, 4	18	Questions are based on curves in both two and three dimensional spaces, and surfaces to assess students' understanding of basic concepts and skills
2	Class exercises	1, 2, 3	3	The questions enable students to apply basic concepts and techniques of coordinate geometry to a range of mathematical problems.
3	Three Take-home Assignments	1, 2, 3	9	The assignments provide students chances to demonstrate their achievements on techniques of coordinate geometry 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. Test

Criterion

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

2. Hand-in assignments

Criterion

Ability to understand the basic concepts and techniques of coordinate geometry

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

Assessment Task

4. Examination

Criterion

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

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**

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