MAPÚA INSTITUTE OF TECHNOLOGY
Department of Mathematics

VISION

The Mapua Institute of Technology shall be a global center of excellence in education by providing instructions that are current in content and state-of-the-art in delivery; by engaging in cutting-edge, high impact research; and by aggressively taking on present-day global concerns.

MISSION

a. The Mapua Institute of Technology disseminates, generates, preserves and applies knowledge in various fields of study.

b. The Institute, using the most effective and efficient means, provides its students with highly relevant professional and advanced education in preparation for and furtherance of global practice.

c. The Institute engages in research with high socio-economic impact and reports on the results of such inquiries.

d. The Institute brings to bear humanity's vast store of knowledge on the problems of industry and community in order to make the Philippines and the world a better place.

BASIC STUDIES EDUCATIONAL OBJECTIVES	MISSION			
	a	b	c	d
1. To provide students with a solid foundation in mathematics, physics, general chemistry and engineering drawing and to apply knowledge to engineering, architecture and other related disciplines.	✓	✓	✓	✓
2. To complement the technical training of the students with proficiency in oral, written, and graphics communication.	✓	✓	✓	✓
3. To instill in the students human values and cultural refinement through the humanities and social sciences.	✓	✓	✓	✓
4. To inculcate high ethical standards in the students through its integration in the learning activities.	✓	✓	✓	✓

COURSE SYLLABUS

1. **Course Code:**   Math 14

2. **Course Title:**   **Plane and Solid Analytic Geometry**

3. **Pre-requisite:**   MATH 10, MATH12

4. **Co-requisite:**   none

5. **Credit:**   3 units

6. **Course Description:**   This course covers topics on fundamental concepts and theorems in two-dimensional and three-dimensional geometry using rectangular coordinate system. It also introduces the polar coordinate system and polar curves. It also deals with the study of the properties and graphs of lines, the algebraic curves, the circle, the conics, polar curves and different surfaces.

7. **Student Outcomes and Relationship to Basic Studies Educational Objectives**

Student Outcomes		Basic Studies Educational Objectives			
		1	2	3	4
(a)	an ability to apply knowledge of mathematics, science, and engineering	√			
(b)	an ability to design and conduct experiments, as well as to analyze and interpret from data				
(c)	an ability to design a system, component, or process to meet desired needs				
(d)	an ability to function on multidisciplinary teams			√	√
(e)	an ability to identify, formulate, and solve engineering	√			

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	problems										
(f)	an understanding of professional and ethical responsibility									√	
(g)	an ability to communicate effectively						√				
(h)	the broad education necessary to understand the impact of engineering solutions in the global and societal context	√									
(i)	a recognition of the need for, and an ability to engage in life-long learning	√									
(j)	a knowledge of contemporary issues	√									
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	√									

8. Course Outcomes (COs) and Relationship to Student Outcomes

Course Outcomes After completing the course, the student must be able to:	Student Outcomes*										
	A	b	c	d	e	F	g	h	i	j	k
1. Apply principles gained from the prerequisite courses	D				D		D				
2. Apply the fundamental concepts in solving application problems in geometry; discuss comprehensively properties of the algebraic functions and apply these to sketch algebraic curves and lines.	D				D		D				
3. Apply the properties of the algebraic functions to describe the circles and the conics for the purpose of sketching and writing the equation that describes a particular geometry. Finally, to be able to solve application problems involving these geometries.	D				D		D				
4. Apply the properties of the algebraic/non-algebraic functions in sketching the required graph in an appropriate 2-D / 3-D coordinate system.	D				D		D				

* Level: I- Introduced, R- Reinforced, D- Demonstrated

9. Course Coverage

WEEK	TOPIC	TLA	AT		COURSE OUTCOME
1	**Mission and Vision of Mapua Institute of Technology** **Orientation and Introduction to the Course** Discussion on COs, TLAs, and ATs of the course Overview on student-centered learning and eclectic approaches to be used in the course		Examination		
	DIAGNOSTIC EXAMINATION		CO1		
	Fundamental Concepts (Definition and Application) - The Rectangular Coordinate System - Directed Line Segment - Distance Between Two Points	Guided Learning	One-on-One Interview #1 Class Produced Reviewer #1A		
	- Division of Line Segments	Working through			

		Examples		
	- Inclination and Slopes of Lines - Angles Between Two Intersecting Lines **Locus of a Moving Point Defining** - Line - Circle - Conics	Guided Learning		
2	**Lines and First Degree Equations** - General Equation - Standard Forms - Two- Point Form - Point- Slope Form	Working through Examples	Class Produced Reviewer #1B	**CO2**
	- Slope-Intercept Form - Intercept Form - Normal Form			
	- Directed Distance from a Point to a Line - Distance between Parallel Lines	Dyadic Discussion		
3	**Algebraic Curves** - Properties of Algebraic Curves - Extent of the graph (Domain and Range) - X and Y - Intercepts - Symmetry with respect to the X-axis, Y-axis and the Origin - Asymptotes (Vertical, Horizontal and Slant) - Sketching Graph of: - Polynomial Functions (Type 1)	Group Discussion/ Concept Mapping	Mind Map: Outline of Procedure for Curve Tracing	
	- Rational Function (Type II)	Class Argumentation		
4	- Irrational Function (Type III) - Irrational Functions (Type IV)	Class Critique	Class Produced Reviewer #1C	
	LONG QUIZ 1			
	The Circles - Definition - General and Standard Equations - Reduction of General Equation to the Standard Form	Cooperative Learning/Group Discussion	Class Produced Reviewer #2A	
	- Writing equations of Circles Determined by Geometric Conditions - Determination of Radical Axis - Conditions and Equations Defining Family of Circles	Dyadic Discussion		

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5	**The Conics** **- The Parabola** - Definition - General Equation - Standard Equation and Graph of Parabola with Vertex at (0,0)	Guided Discovery / Class Discussion		
	- Standard Equation and Graph of Parabola with Vertex at (h,k) - Application Problems Involving the Parabola	Guided Learning/ Discovery	Class Produced Reviewer #2B	
6	**- The Ellipse** - Definition - General Equation - Standard Equation and Graph of Ellipse with Center at (0,0)	Cooperative Learning		CO3
	- Standard Equation and Graph of Ellipse with Center at (h, k) - Application Problems Involving the Ellipse	Dyadic Discussion		
	- The Hyperbola - Definition - General Equation - Standard Equation and Graph of Hyperbola with Center at (0,0)	Guided Discovery	Class Produced Reviewer #2C	
	- Standard Equation and Graph of Hyperbola with Center at (h, k) - Application Problems Involving the Hyperbola			
	LONG QUIZ 2			
7	**Simplification of Equations** - Simplification of Equations by Translation of Axes - The General Second Degree Equation (Identification of Conics)	Dyadic Discussion	Class Produced Reviewer #3A	
	- Simplification of Equation by Rotation of Axes	Guided Discovery / Class Discussion		
8	**The Polar Curves** - The Polar Coordinate System - Relationship Between Polar and Rectangular Coordinate Systems - Transforming Polar Equations to	Guided Discovery		

				CO4
	Rectangular Form (vice versa)			

	- Properties of Polar Curves
	   - Intercept
	   - Symmetry
	- Sketching Polar Curves
		Dyadic Discussion		

9	**The Parametric Equations** - Definition - Elimination of parameter to transform equation to the rectangular form. - Sketching Parametric Equations	Guided Discovery		
	Three-Dimensional Geometry - Space Coordinates - Plotting Points in 3-D - Distance Between Two Points in Space - Midpoint Formula	Cooperative Learning / Class Discussion Class Discussion	Class Produced Reviewer #3B	

10	- Equations and Graphs of Surfaces:
	   - Planes
	   - Cylindrical Surfaces
	   - Quadric Surfaces
		Guided Discovery		

	PROJECT		**Reflective Journal** **Poster/Project Output**	
	LONG QUIZ 3			
11	**SUMMATIVE ASSESSMENT** **FINAL EXAMINATION**			CO1, CO2, CO3, CO4

10. Opportunities to Develop Lifelong Learning Skill

To help students understand and apply the mathematical principles of Analytic Geometry and provide them with the needed working knowledge of the different mathematical concepts and methods for them to fully understand the relationship of Analytic Geometry with the increasingly complex world.
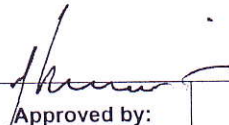
11. Contribution of Course to Meeting the Professional Component

Engineering Topics	:	0 %
General Education	:	0 %
Basic Sciences and Mathematics	:	100%

12. Textbook:
Analytic Geometry, 6th ed, 2006
Douglas F. Riddle

13. Course Evaluation

Student performance will be rated based on the following:

Assessment Tasks		Weight (%)	Minimum Average for Satisfactory Performance (%)
CO 1	Diagnostic Examination	10	7
CO 2	RLA	3.6	15.1
	Long Test 1	18	
CO 3	RLA	3.2	14.84
	Long Test 2	18	
CO 4	RLA	3.2	15.54
	Long Test 3	14	
	Project	5	
Summative Assessment: Final Examination		25	17.5
TOTAL		100	70

The final grades will correspond to the weighted average scores shown below:

Final Average	Final Grade
$96 \leq x < 100$	1.00
$93 \leq x < 96$	1.25
$90 \leq x < 93$	1.50
$86 \leq x < 90$	1.75
$83 \leq x < 86$	2.00
$80 \leq x < 83$	2.25
$76 \leq x < 80$	2.50
$73 \leq x < 76$	2.75
$70 \leq x < 73$	3.00
Below 70	5.00 (Fail)

13.1. Other Course Policies

a. Attendance
According to CHED policy, total number of absences by the students should not be more than 20% of the total number of meetings or 9 hrs for a three-unit-course. Students incurring more than 9 hours of unexcused absences automatically gets a failing grade regardless of class standing.

b. Submission of Assessment Tasks
Submission of students' work should be on time. Late submittals will not be accepted.

c. Written Examination
Long quizzes and final examination will be as scheduled. No special examination will be given unless for valid reason subject to approval of the Department Chairman.

d. Course Portfolio
Course portfolio will be collected at the end of the term.

e. Language of Instruction
Lectures, discussion, and documentation will be in English. Written and spoken work may receive a lower mark if it is, in the opinion of the instructor, deficient in English.

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f. Honor, Dress and Grooming Codes
All of us have been instructed on the Dress and Grooming Codes of the Institute. We have all committed to obey and sustain these codes. It will be expected in this class that each of us will honor the commitments that we have made.
For this course the Honor Code is that there will be no plagiarizing on written work and no cheating on exams. Proper citation must be given to authors whose works were used in the process of developing instructional materials and learning in this course. If a student is caught cheating on an exam, he or she will be given zero mark for the exam. If a student is caught cheating twice, the student will be referred to the Prefect of Student Affairs and be given a failing grade.

g. Consultation Schedule
Consultation schedules with the Professor are posted outside the faculty room and in the Department's web-page (http://math.mapua.edu.ph). It is recommended that the student first set an appointment to confirm the instructor's availability.

14. Other References

14.1. Books

a. Plane Analytic Geometry, Mijares, 1991
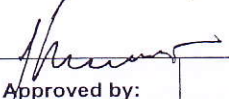b. Analytic Geometry, Fuller and Tarwater

14.2 Websites
SciLab

15. Course Materials Made Available
Course schedules for lectures and quizzes
    Samples of assignment/Problem sets of students
    Samples of written examinations of students
        End-of-course self-assessment

16. Committee Members:

Servando D. Bernardo
Maria Rosario C. Exconde
Ernarnie C. De Guzman
Reynaldo C. Lanuza
Gerardo G. Usita
Alberto C. Villaluz

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