

**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.

PROGRAM EDUCATIONAL OBJECTIVES (BIOLOGICAL ENGINEERING, CHEMICAL ENGINEERING, CIVIL ENGINEERING, ENVIRONMENTAL AND SANITARY ENGINEERING, INDUSTRIAL ENGINEERING, MECHANICAL ENGINEERING AND MANUFACTURING ENGINEERING))	MISSION			
	a	b	c	d
1. To enable our graduates to practice as successful engineers for the advancement of society.	✓	✓	✓	✓
2. To promote professionalism in the engineering practice.	✓	✓	✓	✓

**COURSE SYLLABUS**

1. Course Code:

Math 10-3
2. Course Title:

Algebra
3. Pre-requisite:

none
4. Co-requisite:

none
5. Credit:

3 units
6. Course Description:

This course covers discussions on a wide range of topics necessary to meet the demands of college mathematics. The course discussion starts with an introductory set theories then progresses to cover the following topics: the real number system, algebraic expressions, rational expressions, rational exponents and radicals, linear and quadratic equations and their applications, inequalities, and ratio, proportion and variations.
7. Student Outcomes and Relationship to Program Educational Objectives

Student Outcomes		Program Educational Objectives	
		1	2
(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 problems	✓	✓

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(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	√	√
(l)	knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments	√	√

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

Course Outcomes		Student Outcomes*											
After completing the course, the student must be able to:		a	b	c	d	e	f	g	h	i	j	k	l
1.	Discuss and apply comprehensively the concepts on sets and the real number system, and perform operations on algebraic expressions.	D				D		D					
2.	Apply the fundamental concepts in performing operations on rational expressions, radicals and complex numbers.	D				D		D					
3.	Solve linear equations and its applications.	D				D		D					
4.	Solve quadratic equations and inequalities and its applications.	D				D		D					

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

9. Course Coverage

WEEK	TOPIC	TLA	AT	COURSE OUTCOME
1	<b>Mission and Vision of Mapua Institute of Technology</b> <b>Orientation and Introduction to the Course</b> Discussion on COs, TLAs, and ATs of the course Overview on student-centered learning and eclectic approaches to be used in the course			
	<b>Sets and the Real Number System</b> <ul style="list-style-type: none"><li>- Concepts of Set</li><li>- Operations on Sets</li><li>- Real Number System</li><li>- Properties of Real Numbers</li></ul>	Guided Learning / Working through Examples	Class Produced Reviewer #1A	CO1
2	<b>Polynomials</b> <ul style="list-style-type: none"><li>- Integer and Zero Exponents</li><li>- Operations on Algebraic Expressions</li><li>- Special Products</li></ul>	Guided Learning / Working through Examples	Class Produced Reviewer #1B	
3	<ul style="list-style-type: none"><li>- Factoring Polynomial</li></ul>		Class Activity # 1	
	LONG QUIZ 1			
4	<b>Rational Expressions</b> <ul style="list-style-type: none"><li>- Concept of Fraction</li><li>- Properties of Fractions</li><li>- Reduction of Rational Expressions to Lowest Terms</li><li>- Operations on Rational Expressions</li><li>- Complex Fractions</li></ul>	Cooperative Learning/Group Discussion	Class Produced Reviewer #2A	CO2

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5	<b>Radicals and Complex Numbers</b> <ul style="list-style-type: none"><li>- Rational Exponents and Radicals</li><li>- Properties of Radicals</li><li>- Operations on Radicals</li><li>- Complex Numbers</li><li>- Operations on Complex Numbers</li></ul>	Guided Learning/ Discovery / Cooperative Learning	Class Produced Reviewer #2B  Class Activity # 2	
6	<b>Equations</b> <ul style="list-style-type: none"><li>- Definition of terms</li><li>- Properties of Equality</li><li>- Equivalent Equations</li><li>- Linear Equations in One Variable</li><li>- Equations Leading to the Form <math>ax+b=0</math></li></ul>	Guided Discovery / Class Discussion	Class Produced Reviewer #3A	CO3
	<ul style="list-style-type: none"><li>- Absolute Value Equations</li><li>- Literal Equations</li></ul>			
7	<ul style="list-style-type: none"><li>- Applications of Linear Equations in One Variable<ul style="list-style-type: none"><li>• Modeling with Equations</li><li>• Number and Digit Problems</li><li>• Geometric Problems</li><li>• Money and Coin Problems</li><li>• Investment Problems</li><li>• Age Problems</li><li>• Mixture Problems</li></ul></li></ul>			
8	<ul style="list-style-type: none"><li>• Uniform Motion Problems</li><li>• Work Problems</li><li>• Clock Problems</li></ul>			
LONG QUIZ 3 ( 30% online, 70% written)				
	<b>Quadratic Equations in One Variable</b> <ul style="list-style-type: none"><li>- Definition of Terms</li><li>- Nature Of Roots of Quadratic Equations</li><li>- Solving Quadratic Equations<ul style="list-style-type: none"><li>• Solution by Factoring (The Zero-Product Property)</li><li>• Solution by Completing the Square</li><li>• Solution by Quadratic Formula</li></ul></li></ul>	Guided Discovery / Class Discussion	Class Produced Reviewer #4A	CO4
9	<ul style="list-style-type: none"><li>- Equations Leading to Quadratic</li><li>- Applications</li></ul>			
	<b>Inequalities</b> <ul style="list-style-type: none"><li>- Symbols of Inequalities</li><li>- Kinds of Inequalities<ul style="list-style-type: none"><li>• Absolute/ Conditional Inqualities</li></ul></li><li>- Properties of Inequalities</li><li>- Solution Set of an Inequality in One Variable<ul style="list-style-type: none"><li>• Set Notation</li><li>• Interval Notation</li><li>• Graphical Representation</li></ul></li><li>- Linear and Nonlinear Inequalities</li></ul>			
10	<b>Ratio, Proportion and Variation</b> <ul style="list-style-type: none"><li>- Ratio<ul style="list-style-type: none"><li>• Definition</li><li>• Ways of Writing Ratio</li><li>• Characteristic s of Ratio</li></ul></li><li>- Proportion</li></ul>			

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	<ul style="list-style-type: none"> <li>• Definition of Terms</li> <li>• Solving Proportion</li> <li>- Variation</li> <li>• Definition of Terms: Variation, Constant of Proportionality</li> <li>• Direct Variation, Inverse Variation, Joint Variation, Combined Variation</li> </ul>			
	PROJECT			
	LONG QUIZ 4			
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 Algebra and provide them with the needed working knowledge of the different mathematical concepts and methods for them to fully understand the relationship of Algebra 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: College Algebra and Trigonometry, 7<sup>th</sup> edition  
Richard N. Aufmann, Vernon C. Barker, Richard D. Nation

13. Course Evaluation

Student performance will be rated based on the following:

Assessment Tasks		Weight (%)	Minimum Average for Satisfactory Performance (%)
CO 1	Long Quiz 1	12.5	12.25
	CPR 1	2.5	
	CA 1	2.5	
CO 2	Long Quiz 2	12.5	12.25
	CPR 2	2.5	
	CA 2	2.5	
CO 3	Long Quiz 3 (online)	3.75	12.25
	Long Quiz 3 (written)	8.75	
	CPR 3	2.5	
	CA 3	2.5	
CO 4	Long Quiz 4	12.5	12.25
	CPR 4	2.5	
	CA 4	2.5	
	PROJECT	5.0	3.5
Summative Assessment: Final Examination		25	17.5

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TOTAL	100	70
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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 hours 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.
- 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

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- 14.1. Books
- a, College Algebra and Trigonometry by Louis Leithold, International Ed., 2001
  - b. College Algebra and Trigonometry by Matk Dugopolski, 2<sup>nd</sup> Ed.
  - c. College Algebra, enhances with Graphing Utilities by Michael Sullivan and Michael Sullivan III, 2<sup>nd</sup> Ed.
  - d. College Algebra and Trigonometry by Nax Sobel and Lemer Norbert, 5<sup>th</sup> Ed., 1998
  - e. Applied Algebra and Trigonometry by Linda Davis, 3<sup>rd</sup> Ed., 2003
  - f. Algebra and Trigonometry by James Stewart, Lothar Redlin and Saleem Watson, 2<sup>nd</sup> ed, 2007

- 14.2 Website
- Enhanced Web Assign Learning Management System

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:
- |                       |                            |
|-----------------------|----------------------------|
| Course Cluster Chair: | Dionisia M. Ianuza         |
| CQI Cluster Chair:    | Floro Deograsis G. Llacuna |
| Members :             | Clarinda B. Catan          |
|                       | James Alfred M. Escalona   |
|                       | Raquel B. Teodoro          |
|                       | Teresita L. Zapanta        |

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