



# MABALACAT CITY COLLEGE

INSTITUTE OF ARTS AND SCIENCES

First Semester A.Y. 2023-2024

Outcome-Based Teaching and Learning Plan and Module Guide for *(Mathematics in the Modern World-MATH101)*



**VISION:** Mabalacat City College envisions itself to be the top choice in the community it serves for quality education and training by 2025.

**MISSION:** The Mission of Mabalacat City College is to meet the needs of its community as a center for learning aiming for open admission policy.

## COURSE DESCRIPTION:

This course aims to expose the learners to the practical applications of mathematics to help them improve their problem-solving skills, critical thinking, self-management and collaborative skills, as they work in small groups, and that mathematics is for everyone who is willing to learn. Students will use real-life data relevant to their future career in processing, managing and analysis of data. Most topics are new to the learners and will find it exciting to learn about how it is taught. With these learning materials, students will learn how to manage their learning at their own pace and will appreciate that mathematics is useful in their chosen career/profession.

## PROGRAM INTENDED LEARNING OUTCOMES (PILO): Based on CHED Memorandum Order No. 76 series 2017

The graduates of Bachelor of Early Childhood Education should be able to:

1. Demonstrate high level of content and pedagogical knowledge.
2. Demonstrate appreciation for diversity.
3. Manifest collaborative innovative thinking.
4. Possess critical and problem-solving skills.
5. Advocate for children's rights, equity, community, nationalism and democratic ideas.
6. Pursue lifelong learning/

**PRE-REQUISITE:** None

**NUMBER OF UNITS:** 3 Units Lecture





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## LEARNING OUTCOMES:

1. Identify patterns in nature and regularities in the world.
2. Discuss the language, symbols, and conventions of mathematics.
3. Describe the nature of mathematics as a language.
4. Perform correctly the operations on mathematical expressions.
5. Discuss the language and symbols of mathematics.
6. Use a variety of statistical tools to process and manage numerical data.
7. Use mathematics in other areas such as finance, voting, health and medicine, business, environment, arts and design, and recreation.
8. Appreciate the nature and uses of mathematics in everyday life.
9. Affirm honesty and integrity in the application of mathematics to various human endeavors.

## COURSE OUTLINE

Week	Topic	Learning Materials (with references following OER plagiarism and IPR policies)	Intended Learning Outcomes (ILO)	Assessment Tasks (Requirements with schedule or time allotment)	Sustainable Development Goals (SDG) Coherence
<b>GLOBAL KNOWLEDGE/ NATIONAL KNOWLEDGE</b>					
1	<b>ORIENTATION WEEK/ORIENTATION ON THE VISION-MISSION OF THE COLLEGE</b>				





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1-2	<p><b>I. The Nature of Mathematics</b></p> <ol style="list-style-type: none"> <li>1. Patterns in Nature and the World</li> <li>2. Examples of Pattern Recognition</li> <li>3. Fibonacci Sequence</li> <li>4. The Golden Ratio</li> </ol>	<p><b>Teacher's Guide</b></p> <p><b>PowerPoint Presentation: 45-60 mins</b></p> <p><b>Suggested Online Video to View:</b>  Wow Math (2022). <i>PATTERNS AND NUMBERS IN NATURE AND THE WORLD</i>  <a href="https://youtu.be/Y5tcfh1CM88">https://youtu.be/Y5tcfh1CM88</a></p> <p>Wow Math (2020). <i>PART 1: PATTERNS AND NUMBERS IN NATURE AND THE WORLD // MATHEMATICS IN THE MODERN WORLD</i>  <a href="https://youtu.be/I7An1mcFHBU">https://youtu.be/I7An1mcFHBU</a></p> <p>Science ABC (2021). <i>What is the Fibonacci Sequence &amp; the Golden Ratio? Simple Explanation and Examples in Everyday Life</i>  <a href="https://youtu.be/2tv6Ej6JVho">https://youtu.be/2tv6Ej6JVho</a></p> <p><b>Learning Materials:</b> Scientific calculator and measuring device (ruler, tape measure, and meter stick)</p>	<ul style="list-style-type: none"> <li>• Explain the Nature of Mathematics</li> <li>• Discuss how mathematics is exhibited in nature</li> <li>• Identify relationships in patterns</li> <li>• Predict logical connections in patterns</li> <li>• Describe the types of patterns in nature and the world</li> <li>• Explain the general term of the Fibonacci sequence</li> </ul>	<p><b>Worksheet 1 (45 mins)</b></p> <p><b>Due Date: September 15, 2023</b></p>	<p>SDG 4 – Quality Education</p> <p>SDG 14 – Life Below Water</p> <p>SDG 15 – Life on Land</p>
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3-4	<p><b>II. Mathematical Language and Symbols</b></p> <ol style="list-style-type: none"> <li>1. The Language of Mathematics</li> <li>2. Symbols Commonly Used in Mathematics</li> <li>3. The Grammar of Mathematics</li> <li>4. Characteristics of the Mathematics Language</li> <li>5. Translating Words to Algebraic Expressions</li> </ol>	<p><b>Teacher's Guide</b></p> <p><b>PowerPoint Presentation: 45-60 mins</b></p> <p><b>Suggested Online Video to View:</b>  Wow Math (2020). <i>MATHEMATICAL LANGUAGE AND SYMBOL: AN INTRODUCTION    MATHEMATICS IN THE MODERN WORLD</i>  <a href="https://youtu.be/dwKfiXGdo1A">https://youtu.be/dwKfiXGdo1A</a></p> <p>Wow Math (2020). <i>MATHEMATICAL LANGUAGE AND SYMBOL: VARIABLES    MATHEMATICS IN THE MODERN WORLD</i>  <a href="https://youtu.be/ngUotonNTNY">https://youtu.be/ngUotonNTNY</a></p> <p>Mashup Math. <i>TRANSLATING WORDS INTO ALGEBRAIC EXPRESSIONS!</i>  <a href="https://www.youtube.com/watch?v=KmuWR LriQU">https://www.youtube.com/watch?v=KmuWR LriQU</a></p> <p><b>Learning Materials:</b> Worksheets, Writing Materials, and Computer/Laptop</p>	<ul style="list-style-type: none"> <li>• Classify group of words or symbols as mathematical expressions or mathematical sentences</li> <li>• Apply the grammar and characteristics of the Mathematics language in translating Mathematics sentences to Mathematical symbols</li> <li>• Apply the characteristics and conventions of mathematical language in algebra worded problems</li> <li>• Translate English sentences or phrases into mathematical expressions to</li> </ul>	<p><b>Worksheet 2 (45 mins)</b></p> <p><b>Due Date: September 22, 2023</b></p>	<p>SDG 4 – Quality Education</p>
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			solve algebra worded problems		
<b>GLOBAL KNOWLEDGE/NATIONAL KNOWLEDGE/LOCAL KNOWLEDGE</b>					
5-6	<b>III. Reasoning and Problem Solving</b> <ol style="list-style-type: none"> <li>1. Mathematical Reasoning</li> <li>2. Inductive Reasoning</li> <li>3. Deductive Reasoning</li> <li>4. Problem Solving with Patterns</li> <li>5. Polya's Four-Step Problem-Solving Strategy</li> </ol>	<b>Teacher's Guide</b>  <b>PowerPoint Presentation: 45-60 mins</b>  <b>Suggested Online Video to View:</b> Wow Math (2021). <i>PROBLEM SOLVING: INDUCTIVE AND DEDUCTIVE REASONING    MATHEMATICS IN THE MODERN WORLD</i> <a href="https://youtu.be/GcmNSwez5AI">https://youtu.be/GcmNSwez5AI</a>  Wow Math (2021). <i>POLYA'S PROBLEM-SOLVING STRATEGY    MATHEMATICS IN THE MODERN WORLD</i> <a href="https://youtu.be/grIH2hmaid4">https://youtu.be/grIH2hmaid4</a>  <b>Learning Materials:</b> Scientific Calculators, Writing Materials, and Computers/Laptops	<ul style="list-style-type: none"> <li>• Distinguish inductive reasoning from deductive reasoning</li> <li>• Provide symbolic, verbal, and graphical interpretations of statements in a problem description and discuss different ways to solve a problem, and choose which ones to implement</li> <li>• Give examples of inductive and deductive processes of</li> </ul>	<p style="text-align: center;"><b>Oral Recitation</b></p> <p style="text-align: center;"><b>Worksheet 3 (45 mins)</b></p> <p style="text-align: center;"><b>Due Date: October 6, 2023</b></p> <p style="text-align: center;"><b>Worksheet 4 (45 mins)</b></p> <p style="text-align: center;"><b>Due Date: October 13, 2023</b></p>	SDG 4 – Quality Education





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			<ul style="list-style-type: none"> <li>inference</li> <li>Explain Polya's problem-solving techniques in their own words</li> </ul>		
7-8	<p><b>IV. Statistics: Managing and Understanding Data</b></p> <ol style="list-style-type: none"> <li>Measure of Central Tendency</li> <li>Correlation Analysis</li> <li>Regression Analysis</li> <li>Testing of Hypothesis</li> </ol>	<p><b>Teacher's Guide</b></p> <p><b>PowerPoint Presentation: 45-60 mins approximately</b></p> <p><b>Suggested Online Video to View:</b>            Simple Learning Pro (2015). <i>Introduction to Statistics 1.1.</i>  <a href="https://youtu.be/MXaI7sa7q-8">https://youtu.be/MXaI7sa7q-8</a></p> <p>CrashCourse. (2018). <i>Mean, Median, and Mode: Measures of Central Tendency: Crash Course Statistics #3.</i>  <a href="https://youtu.be/kn83BA7cRNM">https://youtu.be/kn83BA7cRNM</a></p> <p>Brandon Foltz. (2013). <i>Statistics 101: Linear Regression, The Least Squares Method.</i>  <a href="https://youtu.be/Qa2APhWjQPc">https://youtu.be/Qa2APhWjQPc</a></p>	<ul style="list-style-type: none"> <li>Understand the use regression analysis to predict the value of a dependent variable based on an independent variable</li> <li>Use linear regression to make predictions</li> <li>Evaluate the assumptions of regression analysis and make inferences about the slope</li> </ul>	<p><b>Worksheet 5 (45 mins)</b></p> <p><b>Due Date: October 20, 2023</b></p> <p><b>Worksheet 6 (45 mins)</b></p> <p><b>Due Date: October 27, 2023</b></p>	<p>SDG 4 – Quality Education</p> <p>SDG 8 – Decent Work and Economic Growth</p>





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		<b>Learning Materials:</b> Scientific calculator, Writing Materials and Computer/Laptop	and correlation coefficient		
9	<b>MIDTERM EXAM (November 6 – 8, 2023)</b>				
10-11	<b>V. Financial Literacy: Making Sense of Money</b> 1. Simple Interest 2. Compound Interest	<b>Teacher’s Guide</b>  <b>PowerPoint Presentation: 45-60 mins approximately</b>  <b>Suggested Online Video to View:</b> Math Teacher Gon (2022). SIMPLE INTEREST   Principal Value, Maturity Value, Rate and Time   Simple and Compound Interest <a href="https://youtu.be/LY3yixM8h-s">https://youtu.be/LY3yixM8h-s</a>  Math Teacher Gon (2022). COMPOUND INTEREST (Compounded Annually)   Maturity Value, Principal, Interest, Rate, Time - Gen Math <a href="https://youtu.be/kyExcEtIzQI">https://youtu.be/kyExcEtIzQI</a>  <b>Learning Materials:</b> Scientific calculator, Writing Materials and Computer/Laptop	<ul style="list-style-type: none"> <li>Define simple interest and compound interest</li> <li>Calculate the accumulated interest</li> <li>Calculate the principal or the maturity value in problems involving simple interest and compound interest</li> </ul>	<b>Worksheet 7 (45 mins)</b>  <b>Due Date: November 17, 2023</b>	SDG 4 – Quality Education  SDG 8 – Decent Work and Economic Growth





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GLOBAL KNOWLEDGE/NATIONAL KNOWLEDGE/LOCAL KNOWLEDGE					
12-13	<b>VI. The Mathematics of Graphs</b> <ol style="list-style-type: none"> <li>1. Introduction to Graph Theory</li> <li>2. Euler Paths and Circuits</li> <li>3. Hamilton Paths and Circuits</li> </ol>	<b>Teacher's Guide</b>  <b>PowerPoint Presentation: 45-60 mins approximately</b>  <b>Suggested Online Video to View:</b> Mathematics in the Modern World (2020). Mathematics of Graphs (Mathematics in the Modern World) <a href="https://youtu.be/d8gjVZu1AIw">https://youtu.be/d8gjVZu1AIw</a>  <b>Suggested Online Video to View:</b> TrevTutor. INTRODUCTION to GRAPH THEORY - DISCRETE MATHEMATICS <a href="https://.youtu.be/HkNdNpKUByM">https://.youtu.be/HkNdNpKUByM</a>  <b>Suggested Web Readings:</b> Euler and Hamiltonian Paths and Circuits <a href="https://courses.lumenlearning.com/wmopen-mathforliberalarts/chapter/introduction-euler-paths/">https://courses.lumenlearning.com/wmopen-mathforliberalarts/chapter/introduction-euler-paths/</a>	<ul style="list-style-type: none"> <li>• Identify whether a graph has a Hamiltonian circuit or path</li> <li>• Differentiate a Euler or Hamilton Circuit from a Euler or Hamilton Path</li> <li>• Use the mathematical concepts and tools in other areas such as in finance, voting, business and networks.</li> <li>• Set up graph models for real-life situations</li> <li>• Competent and skilled to</li> </ul>	<b>Group Activity</b> <b>Due Date: December 8, 2023</b>  <b>Worksheet 8 (45 mins)</b>  <b>Due Date: December 8, 2023</b>	SDG 4 – Quality Education  SDG 9 – Industry, Innovation and Infrastructure  SDG 11 – Sustainable Cities and Communities







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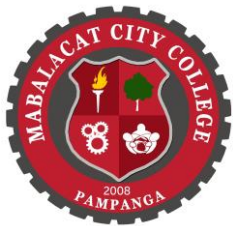
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		<b>Learning Materials:</b> Scientific Calculators, Writing Materials, Colored mark pens or pencils, and Computers/Laptops	meet national, international, and global standards.		
14-15	<b>VII. Voting and Apportionment</b> 1. <b>Introduction to Apportionment</b> 2. <b>Voting Methods</b> - Voting by Ranking - Plurality Method - Borda Count Method	<b>Teacher's Guide</b>  <b>PowerPoint Presentation: 45-60 mins</b>  <b>Learning Materials:</b> Scientific calculator, Writing Materials and Computer/Laptop	<ul style="list-style-type: none"><li>• Use different voting methods to determine the winner among candidates or options</li><li>• Identify which among the voting methods satisfy some fairness criteria</li><li>• Compute the votes necessary to win in the Philippine election as well as the number of the votes that would be enough for one to decide whether to concede or not.</li></ul>	<b>Worksheet 9 (45 mins)</b>  <b>Due Date: December 22, 2023</b>	SDG 4 – Quality Education  SDG 16 – Peace, Justice and Strong Institutions





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16-17	<p><b>VIII. Geometric Designs</b></p> <ol style="list-style-type: none"> <li>1. Tessellation</li> <li>2. Symmetry Operations</li> </ol>	<p><b>Teacher's Guide</b></p> <p><b>PowerPoint Presentation: 45-60 mins</b></p> <p><b>Suggested Online Video to View:</b>  Minity Maths (2022). <i>What Is A Tessellation In Math</i>  <a href="https://www.youtube.com/watch?v=PiOa_vWKJA4">https://www.youtube.com/watch?v=PiOa_vWKJA4</a></p> <p><b>Learning Materials:</b> Scientific Calculators, Writing Materials, and Computers/Laptops)</p>	<ul style="list-style-type: none"> <li>• Define and name a tessellation correctly</li> <li>• Differentiate regular, semi-regular and other tessellations analytically</li> <li>• Create tessellation</li> <li>• Identify and describe the different types of symmetries</li> <li>• Use symmetry in designing and modelling geometric figures that possess both mathematical and artistic values</li> </ul>	<p><b>Worksheet 10 (45 mins)</b></p> <p><b>Due Date: January 12, 2023</b></p>	<p>SDG 4 – Quality Education</p>
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18	<b>SUBMISSION FINAL REQUIREMENT /FINAL EXAMINATIONS (January 15 - 19, 2024)</b>
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### SUMMARY OF REVISIONS:

Revision	Date	Updated by	Short Description of Changes
1.0	August 23, 2023	Aerish Angerie M. Arcilla	New format for OBTLP

### GENERAL GUIDELINES AND POLICIES:

As the College currently follows Hybrid Delivery of Learning on its instruction, the following general guidelines and policies are set by the School to be followed by the faculty-in-charge and the students of the course.

#### Attendance

Checking of attendance during face-to-face classes is a requirement and will be strictly observed.

#### Academic Integrity

Observance of the outmost academic integrity shall be observed by the students of the course. Plagiarism, cheating, and other forms of academic dishonesty shall not be tolerated by the faculty-in-charge nor the Institute.

#### Accomplishment of Requirements

All requirements given by the instructor/faculty-in-charge of the course to the students shall be called/referred to/addressed as “**work output**”. Each work output must be accomplished by the students until the schedule set by the instructor/faculty-in-charge. Final student’s output must also





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be accomplished by the schedule set by the instructor of the course.

## Line of Communication

The course's official line of communication shall be through the following:

Name: **Aerish Angerie M. Arcilla**

Outlook Email Address: [aerish.arcilla@mcc.edu.ph](mailto:aerish.arcilla@mcc.edu.ph)

MS TEAMS: [aerish.arcilla@mcc.edu.ph](mailto:aerish.arcilla@mcc.edu.ph)

Messenger Account: <https://www.messenger.com/t/aerisharcillaa>

The outmost respect and courtesy must be observed by students in communicating to their instructor/faculty-in-charge of the course and to their classmates and vice versa. Any form of disrespectful and discourteous way of communication shall not be tolerated by the School.

## Instructional Materials (IMs)

Working students may avail of the modular type of teaching. MS Teams on-line platform may be utilized by the instructor/faculty-in-charge of the course to the students – adapting the flexible learning scheme.

## Grading System:

Class Standing	
Classwork (Worksheets, Activities, Quizzes, etc.)	30%
Class Participation (Recitation, Forum Discussion)	20%
Attendance	10%
Midterm/Final Examination	40%
	<b>100%</b>





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## References:

Adam, John A. *Mathematics in Nature: Modelling Patterns in the Natural World*

Berenson, M., Levine D., and Krehbiel, T. (2012). *Basic Business Statistics*

Earnhart, Richard T. et. al. *Mathematics in the Modern World Outcome-Based Module (2018)*

Stewart, Ian. (1995). *Nature's Numbers*. BasicBooks, 10 East 53rd Street, New York, NY 10022-5299.

Prepared by:

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cf:

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AVP for Academic Affairs

