

### Course Description

This course deals with nature of mathematics, appreciation of its practical, intellectual, and aesthetic dimensions, and application of mathematical tools in daily life.

The course begins with an introduction to the nature of mathematics as an exploration of patterns (in nature and the environment) and as an application of inductive and deductive reasoning. By exploring these topics, students are expected to go beyond the typical understanding of mathematics as merely a set of formulas but a source of aesthetics in patterns of nature, for example, and a rich language in itself (and of science) governed by logic and reasoning.

The course then proceeds to survey ways in which mathematics provides a tool for understanding and dealing with various aspects of present-day living, such as managing personal finances, making social choices, appreciating geometric designs, understanding codes used in data transmission and security, and dividing limited resource fairly. These aspects will provide opportunities for actually doing mathematics in a broad range of exercises that bring out the various dimension of mathematics as a way of knowing, and test of students' understanding and capacity. (CMO No. 20, series of 2013).

### COURSE LEARNING OUTCOMES (CLO)

Upon completion of this course, students should be able to do the following:	Targeted Program Learning Outcomes (PLO)												
	1	2	3	4	5	6	7	8	9	10	11	12	13
<b>CLO1.</b> Create a timeline in the history of mathematics and choose an approach to appreciate the nature of mathematics.	√												
<b>CLO2.</b> Compare and contrast problems identified methods of problem solving strategies for routine and none-routine problems		√	√	√									
<b>CLO3.</b> Assess their strengths and weaknesses in solving problems in the different areas in General Education Curriculum mathematics in order to consider their readiness in the study of their chosen programs or courses..				√	√	√	√						

### LEARNING PLAN

TOPICS	HOURS	CLO	STRATEGIES/ACTIVITIES	EVALUATION METHODS
Nature of Mathematics 1.1 Patterns and Numbers in nature	2	CLO1 CLO3	Write an analysis of the Video presentation	Graded Homework/Assignment

and the world 1.2 The Fibonacci Sequence 1.3 Mathematics for our World		CLO5	Share observations in the environment	
Speaking Mathematically 2.1 Variables 2.2 The Language of Sets 2.3 The Language of Relations and Functions	4	CLO3 CLO3	Group activity on the concepts of sets	quizzes
Problem Solving 3.1 Inductive and Deductive Reasoning 3.2 Problem Solving with patterns 3.3 Problem Solving Strategies	8	CLO1 CLO2 CLO3	Give examples on inductive and Deductive reasoning. Group Work on the application of problem solving Strategies	Seatwork Exercises Group discussion
Logic 4.1 Logic Statements and Quantifiers 4.2 Truth Tables, Equivalent Statements, and Tautologies 4.3 The conditional and the Biconditional Statements 4.4 The Conditional and Related Statements 4.5 Symbolic Arguments 4.6 Arguments and Euler Diagrams	8	CLO1 CLO2	Analyze information and the relationship between statements Determine the validity of arguments Determine valid conclusions based on given assumptions, and Analyze electronic circuits	Exercises Seatwork Quizzes
Statistics 5.1 Measures of Central tendency 5.2 Measures of Dispersion 5.3 Measures of Relative Position 5.4 Normal Distribution 5.5 Linear Regression and Correlation	8	CLO1 CLO2	State the importance of determining the Measures of Central Tendency, measures of dispersion. Compare measures of relative positions. Explain normal distribution of data. Solve correlations of variables and develop a linear regression model..	Exercises Seatwork Quizzes
<i>The Mathematics of Finance</i> 6.1 Simple Interest 6.2 Compound Interest 6.3 Credit Cards and Consumer Loans 6.4 Stocks, Bonds and Mutual Funds 6.5 Home Ownership	8	CLO1 CLO3	Solve Simple interest, compound interest. Explain the nature of credit cards and consumer loans, stocks, bonds and mutual funds, and home ownership Enumerate the causes of inflation	Exercises Seatwork Quizzes

The Mathematics of Graphs 7.1 Graphs and Euler Circuits 7.2 Weighted Graphs 7.3 Planarity and Euler's formula 7.4 Graph Coloring	6	CLO1 CLO2 CLO3	Draw graphs. Demonstrate Hamiltonian Circuits Find Hamiltonian circuits in a weighted graph Illustrate Greedy Algorithm Color graphs	Exercises Seatwork Quizzes
Apportionment and Voting 8.1 Introduction to Apportionment 8.2 Introduction to Voting 8.3 Weighted Voting system	4	CLO3 CLO2	Illustrate Hamilton, Jefferson plan Explain the Huntington-Hill Apportionment principle. Discuss the Borda count method of voting. Illustrate the Weighted voting system.	Exercises Seatwork Quizzes
Measurement and Geometry 9.1 Measurement 9.2 Basic concepts of Euclidean Geometry 9.3 Perimeter and Area of Plane figures 9.4 Properties of Triangles 9.5 Volume and Surface Area 9.6 Right Triangle Trigonometry 9.7 Non-Euclidean geometry 9.8 Fractals	6	CLO1 CLO3 CLO2	Solve problems in the study of triangles	Exercises Seatwork Quizzes

#### FINAL COURSE OUTPUT

As evidence of attaining the following learning outcomes, the student is required to do and submit the following during the indicated dates of the semester:

COURSE LEARNING OUTCOME	REQUIRED FINAL COURSE OUTPUT	DUE DATE
CLO1 CLO3 CLO7	Submit the Portfolio on or before the final exam	Final Period

#### RUBRIC FOR ASSESSMENT

CRITERIA	MASTERFUL 4	SKILLED 3	APPRENTICE 2	NOVICE 1	RATING
<b>Criteria 1 Content (50%)</b>	Demonstrate creativity in the presentation of content in the portfolio. (Beyond the basic requirement)	Demonstrates general understanding of the guidelines in the submission of the portfolio	Incomplete files of the Portfolio	Unorganized compilation of the portfolio	
<b>Criteria 2 Organization</b>	Demonstrate creativity in the presentation of the portfolio. (Beyond	Demonstrates general understanding of the guidelines in the	Incomplete files of the Portfolio	Unorganized compilation of the portfolio	

(30%)	the basic requirement)	submission of the portfolio			
<b>Criteria 3 Presentation (20%)</b>	Demonstrate creativity in the presentation of the portfolio. (Beyond the basic requirement)	Demonstrates general understanding of the guidelines in the submission of the portfolio	Incomplete files of the Portfolio	Unorganized compilation of the portfolio	
<b>TOTAL</b>					

### OTHER REQUIREMENTS AND ASSESSMENTS

Aside from the final output, the students will be assessed at other times during the semester by the following:

#### *Small Group Activities and Assignments*

Group Task- Designing a figure using mathematical model.

#### *Major Exams*

There are four major examination prelim, midterm, pre-final, final period

#### *Formative Assessments*

Midterm Period- Prove theorems and make an investigatory projects on patterns

Pre-final Period- Oral/Boardwork presentation on the assigned problem

Final Period- submit the Portfolio

### GRADING SYSTEM

Rubrics-based rating for all assessments are given the corresponding weights to comprise the grade that the student gets for the course:

Conceptual Activities	10%	Passing mark is 50% which is equivalent to 3.0  Grade per period= Prelim Grade x 25% + Midterm Grade x 25% + 50% Pre-final and Final Period
Quizzes.	20%	
Major Examination	30%	
Performance Task	40%	
<b>TOTAL</b>	<b>100%</b>	

#### **Learning Materials:**

##### *Textbook:*

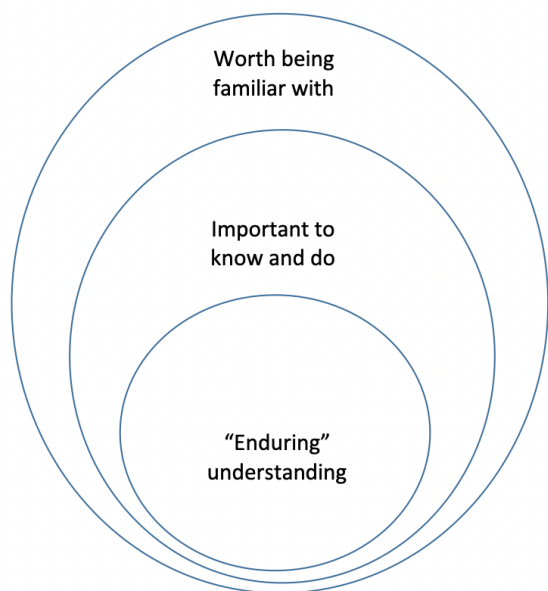
Aufman, Richard et al (2018) Mathematical Excursions fourth Edition. Cengage Learning

##### *References:*

URL: [http://math.about.com/od/analyticgeometry/Analytic\\_gGeometry.htm](http://math.about.com/od/analyticgeometry/Analytic_gGeometry.htm)

<b>Recalibrations on the Syllabus Above</b>		
<b>TOPICS</b>	<b>STRATEGIES/ACTIVITIES</b>	<b>EVALUATION METHODS</b>
Nature of Mathematics 1.1 Patterns and Numbers in Nature 1.2 The Fibonacci Sequence 1.3 Mathematics for our World	<ul style="list-style-type: none"> <li>• Share observations in the environment.</li> <li>• Group share of ideas on how mathematics involves in the world.</li> </ul>	Seatwork Exercises Group Discussions
Speaking Mathematically 2.1 Variables 2.2 The Language of Sets 2.3 The Language of Relations and Functions	Group Activity on the concepts of sets	Seatwork Exercises Group Discussions
Problem Solving 3.1 Problem Solving Strategies	Presentation via video on a chosen word problem.	Performance task
Statistics 4.1 Measures of central Tendency 4.2 Measures of Dispersion 4.3 Measures of Relative Position	<ul style="list-style-type: none"> <li>• State the importance of determining the Measures of Central Tendency, Measures of dispersion.</li> <li>• Compare measures of relative position.</li> </ul>	Exercises Seatwork Quizzes Open book during assessment
The Mathematics of Finance 5.1 Financial Literacy	Educational campaign on financial literacy.	Performance Task

**INSTRUCTIONAL DESIGN:** Following the Design phase of the ADDIE Model, some of the topics are omitted, the remaining ones are the most essential topics.



- Sets and its operation
- Venn diagram and application of sets
- Patterns and Numbers in Nature and the World
- The Fibonacci Sequence
- Polya's 4-steps in problem solving

- Problem solving strategies
- Data and Statistics
- Mathematics of Finance
- Mathematical problems involving patterns

Produce an action research that shows competence in problem solving, financial management, voting, health and medicine, arts and design, and recreation, in accordance to professional accepted standards of data presentation and interpretation.

∴ Hermae Joyce Toraja

OL: Holy Name University

SE: Mathematics in the Modern World

## **EDUCATIONAL TOOLS AND PLATFORM INTEGRATION:**

<b>Course Title</b>	<b>Mathematics in the Modern World</b>
<b>Learning Outcome</b>	Solve problems following the
<b>Topic</b>	Polya's 4-steps in problem solving Polya's 4-steps.

<b>Activity Name</b>	Performance task: Polya's 4-steps in problem solving
<b>Objective/ Learning Competency</b>	Create a video presenting the strategies in solving mathematical and real-life problems.
<b>Tool &amp; Platforms Needed</b>	<b>Students are free to select the tools and platforms they would like to use. (Ex: PowerPoint, Canva, Editing apps, etc.)</b>
<b>Total Screen Time</b>	<b>Maximum will be 2 hours.</b>

<b>Course Title</b>	<b>Mathematics in the Modern World</b>
<b>Learning Outcome</b>	Educate an audience about financial literacy
<b>Topic</b>	Mathematics of Finance
<b>Activity Name</b>	Performance task: Financial Literacy
<b>Objective/ Learning Competency</b>	Create a video in educating the youth on financial matters.
<b>Tool &amp; Platforms Needed</b>	<b>Students are free to select the tools and platforms they would like to use. (Ex: PowerPoint, Canva, Editing apps, etc.)</b>
<b>Total Screen Time</b>	<b>Maximum will be 2 hours.</b>
<b>Instruction/ Procedures/Mechanics</b>	<ol style="list-style-type: none"> <li>1. Select from the following topics on which you are going to cover in the video: <ol style="list-style-type: none"> <li>a. Budgeting</li> <li>b. Saving</li> <li>c. Investing</li> <li>d. Importance of Financial Literacy</li> <li>e. Any topics as long as it talks about Finances</li> </ol> </li> <li>2. Search on the topic that you selected and create a script for your video.</li> <li>3. Film yourself with the script the you have.</li> <li>4. Add subtitles, background music, etc. in your video.</li> <li>5. All spoken language is acceptable in making this video but you are not allowed to say bad words.</li> <li>6. The video must be 1-3 minutes in length, no more, no less.</li> </ol>

**ASSESSMENT:** The assessments in this recalibrated syllabus focus more on the group activities, and project-based assessments.

### ***STUDENT INTERACTION MANAGEMENT:***

- A. Student-Teacher Interaction – unlike in the previous syllabus the students can easily reach out of their teachers via online platforms.
- B. Student-Student Interaction- the group activities will serve as the student to student interaction. And both the performance task above will let the Students teach
- C. Student-Content Interaction- in the online environment, students are more prone to the content interaction as videos and PowerPoint Presentations will be provided.
- D. Student-Interface Interaction- there are a lot of things that students can learn in social media as most of them have gadgets and accounts. The thing is that I hope they can filter and assess well the things that they see.

**DATA PRIVACY:** The data privacy is made by the university and submitted in Activity 11.

## Classroom Policies on Data Privacy

### I. ON THE USE OF EDGE- AND HEIGHTS ONLINE

#### A. Learning Management System

1. All activities relating to online learning shall be conducted through Google Classroom, the official learning management system (LMS) under the domain of the University. That is, the structure, delivery of lessons and access to learning materials shall be done through it. Utilization of other similar online learning platforms not authorized by the University is highly discouraged as their capability to protect personal information collected through the course of its usage has not been assessed thus, putting the privacy and security of the faculty and students at risk. Pre-recording of lectures in a form of video may be made using Zoom or other similar screen casting tools and upload the same into the Google Classroom.

2. In terms of announcements and postings, ensure that personal information is not published by batch or group where other persons not intended to be informed may be able to acquire knowledge about it. The phrase “by batch” includes students enrolled in the same online class. Grades, test scores, health or psychological assessment results, comments on performance should be released to the student concerned so as to prevent unauthorized accessing and processing of these personal sensitive information.

3. Downloading of learning materials or files containing personal information stored within the LMS should be limited only when it is necessary in the pursuit of a legitimate purpose or interest and its processing shall be subject to the conditions set forth under Section 12 of the Data Privacy Act. To prevent indiscriminate downloading of files and processing of the information contained therein beyond the prescribe term allowed for a particular course or subject, a fixed retention period within which to store files and personal information shall be followed as the courses created in the Google Classroom have a scheduled consistent life cycle from creation to disposal. Furthermore, retention of any files downloaded should only be until to the extent they are needed based on the purpose of collecting such information.

## **B. On the Use of Other Similar Online Learning Platforms and Social Media**

All school-related matters must be done through the official applications and tools recognized by the school such as Google Classroom as the learning management system, Google Chat for direct messages to students or class conversation and Google Meet for video meetings or virtual real time classes. Other means of communication are highly discouraged to protect the privacy and security of the faculty and students. Lesson deliverables shall be done through the Google Classroom. Online messaging applications such as Facebook Chat and Messenger may be used, but strictly only to communicate announcements and instructions and not for sharing learning materials, documents, and files.

## **C. On the Storage of Personal Data**

1. It is recommended that all personal data collected during the conduct of a course shall be stored in the Google Classroom so that proper protection and retention shall be followed.

2. Personal data or information collected through the course of the conduct of online classes shall not be stored in a personal account. Official HNU accounts intended as cloud storage of these files like Google Drive, OneDrive, Drop Box and the like shall be used to ensure that personal data or information collected on the course of official and authorized school activities stays within the official work environment of the university.

3. Such personal data or information should be disposed of securely when its intended and legitimate purpose for collection and processing cease to exist.

## **D. On the Use of Camera and Recording of Synchronous Video Sessions**

The principle of necessity and sound judgment shall be considered in deciding whether or not students are required to turn on their camera during a live synchronous video session with the teacher. Below are some of the guidelines which you shall follow in considering such usage:



1. If the performance of the students can be assessed thru written documents, video recording, audio recording and similar outputs, then the use of live webcam shall not be necessary.
2. To foster interaction in the class, chat or audio discussion is preferred over webcam on the part of the student however the teacher may livestream the presentation.
3. Online synchronous sessions with video of the students turned on is still permissible but recording the same or submission of similar video recordings is an action that requires thorough examination under the precept of Data Privacy law, though even without recording, turning on the video when not indispensable to the said activity should not be a requirement to the data subject.

#### **E. On Sharing of Files or Information to the Public**

Files or data uploaded to and stored in the learning management system may contain information which are confidential, personal or sensitive, legally protected or subject to the retention and P a g e | 4 disposal policy and procedures of the university. As such, public dissemination through posting or sharing of such files or data in any media does not just run contrary to public policy but also violate the Data Privacy and Intellectual Property laws as well as other rules and regulations. Posting on public storage or public disclosure of the aforementioned in social media, vlogs, blogs, websites or other similar means o is strictly prohibited unless prior explicit authorization, consent or approval from the University is sought.

Source: [https://mis.hnu.edu.ph/download/HNU\\_EDGE\\_Distance\\_Learning\\_Policy.pdf](https://mis.hnu.edu.ph/download/HNU_EDGE_Distance_Learning_Policy.pdf)