Republic of the Philippines
CEBU TECHNOLOGICAL UNIVERSITY
MAIN CAMPUS
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COURSE SYLLABUS
in
GEC-MMW
Mathematics in the Modern World
First Semester, AY 2021 - 2022

Department/Area :
Curriculum   :
Curricular Year :
No. of   : 54
Hours/Sem
Credit Unit(s)   : 3.0
Prerequisites   : None

Vision of the University   : A premier multidisciplinary-technological university

Mission of the University : The University shall primarily provide advanced professional and technical instruction for special purposes, advanced studies in industrial trade, agriculture, fishery, forestry, aeronautics and land-based programs, arts and sciences, health sciences, information technology and other relevant fields of study. It shall also undertake research and extension services, and provide progressive leadership in its areas of specialization.

Goals of the University   : The University shall produce scientifically and technologically oriented human capital equipped with appropriate knowledge, skills, and attitudes. It shall likewise pursue relevant research, strengthen linkages with the industry, community and other institutions and maintain sustainable technology for the preservation of the environment.

Program Outcomes   :   1. Articulate and discuss the latest developments in the specific field of practice,
2. Communicate effectively through oral and in written forms using both English and Filipino,
3. Work effectively and independently in multi-disciplinary and multi-cultural teams,

4. Act in recognition of professional, social, and ethical responsibilities, and,
5. Preserve and promote "Filipino historical and cultural heritage" (based on RA 7722).

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

This 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 encouraged to go beyond the typical understanding of mathematics as merely a set of formulas but as 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 resources fairly. These aspects will provide opportunities for actually doing mathematics in a broad range of exercises that bring out the various dimensions of mathematics as a way of knowing and test the students' understanding and capacity.

Course Learning Outcomes : At the end of the course, the students would be able to:

Knowledge
1. Discuss and argue about the nature of mathematics, what it is, how it is expressed, represented, and used;
2. Use different types of reasoning to justify statements and arguments made about mathematics and mathematical concepts;
3. Discuss the language and symbols of mathematics;

Skills
4. Use a variety of statistical tools to process and manage numerical data;
5. Analyze codes and coding schemes used for identification, privacy, and security purposes;
6. Use mathematics in other areas such as finance;

Values
7. Appreciate the nature and uses of mathematics in everyday life; and,

8. Affirm honesty and integrity in the appreciation of mathematics to various human endeavors.

Course Content:

INTENDED LEARNING OUTCOME(S) Within the semester, the students are expected to:	ASSESSMENT TASK(S)	TEACHING LEARNING ACTIVITY	CONTENTS	LEARNING RESOURCES	REFERENCE	TIME ALLOCATION	REMARKS
1. Relate the course to the mission, vision, and goals of CTU and the College.	Oral examination	Multimedia Teacher-facilitated discussion	Vision, Mission, Goals and Objectives of CTU and the College.	Video: https://www.youtube.com/watch?v=iuOtTWtqs2o	CTU Student's Manual Revision 2015	1.5	
1. Identify the patterns in nature and regularities in the world; 2. Articulate the importance of mathematics in one's life 3. Argue about the nature of mathematics, what it is, how it is expressed, represented, and used 4. Express appreciation for mathematics as a human endeavor	Rubric assessment (nature photography) Paper and pencil test (quiz on Fibonacci sequences) Rubric assessment (PPt presentation on an application of mathematics)	Multimedia Dimensional question approach Group dynamics	**Chapter 1** THE NATURE OF MATHEMATICS Lesson 1. Mathematics in our World • Patterns and Numbers in Nature and the World • The Fibonacci Sequence • Appreciation of Numbers	Computer and LCD Projector Lecture Slides Video: https://www.youtube.com/watch?v=kkGeOWYOFoA&t=4s	Alejan, et al. (2018). *Mathematics in the modern world.* Mutya Stewart (1995). *Nature's Numbers.* Basic Books Feng. *Patterns in Nature and the Mathematics Behind It.* FGCU	1.5 1.5 1.5	

INTENDED LEARNING OUTCOME(S) Within the semester, the students are expected to:	ASSESSMENT TASK(S)	TEACHING LEARNING ACTIVITY	CONTENTS	LEARNING RESOURCES	REFERENCE	TIME ALLOCATION	REMARKS
					Grigas (2013). *The Fibonacci Sequence.* Liberty University Mathigon. *Applications of Mathematics.* URL: https://mathigon.org/applications		
5. Discuss the language, symbols, and conventions of mathematics 6. Explain the nature of mathematics as a language 7. Perform operations on mathematical expressions correctly 8. Acknowledge that mathematics is a useful language	Paper and pencil test (Quiz) Oral examination (matching symbols and sentences)	Group Dynamics Discussion	Lesson 2. Mathematical Language and Symbols • The Mathematical Language • Sets, Functions, Relations, and Operations • Logic	Computer and LCD Projector Lecture Slides	Alejan, et al. (2018). *Mathematics in the modern world.* Mutya Jamison (2000). *Learning the language of mathematics* Fisher (1993). *One*	1.5 3.0 3.0	

INTENDED LEARNING OUTCOME(S) Within the semester, the students are expected to:	ASSESSMENT TASK(S)	TEACHING LEARNING ACTIVITY	CONTENTS	LEARNING RESOURCES	REFERENCE	TIME ALLOCATION	REMARKS
					Mathematical Cat, Please! MathCentre (2003). *Mathematical Language* Handbook of Mathematics: Key Terms, Definitions & Formulas. van den Dries (2016). *Mathematical Logic*		
9. Use different types of reasoning to justify statements and arguments made about mathematics and mathematical concepts 10. Write clear and logical proofs 11. Solve problems involving patterns and recreational problems following Polya's four steps 12. Organize one's methods and approaches for proving and solving problems	Paper and pencil test (Quiz) Rubrics assessment (problem solving)	Film Showing Problem Solving Group Dynamics	<u>Lesson 3</u>. Problem Solving and Reasoning • Inductive and Deductive Reasoning • Problem Solving • Recreational Problems	Computer and LCD Projector Lecture Slides Interactive website: https://www.mathinenglish.com/brainteasers.php	Alejan, et al. (2018). *Mathematics in the modern world.* Mutya Aufmann, et al. (2013). *Mathematical excursions.* Cengage	3.0 3.0 1.5	

INTENDED LEARNING OUTCOME(S) Within the semester, the students are expected to:	ASSESSMENT TASK(S)	TEACHING LEARNING ACTIVITY	CONTENTS	LEARNING RESOURCES	REFERENCE	TIME ALLOCATION	REMARKS
				Video: https://www.youtube.com/watch?v=FLbz_Crdaa4	Hersh (1997). *What is mathematics, really?*. Oxford University Press Virginia Department of Education (2011). *Mathematics Enhanced Scope and Sequence - Geometry* Berkeley Math. *Polya's problem solving techniques* Madachy. *Recreational Mathematics*		
PRELIM EXAMINATION						2.0	

INTENDED LEARNING OUTCOME(S) Within the semester, the students are expected to:	ASSESSMENT TASK(S)	TEACHING LEARNING ACTIVITY	CONTENTS	LEARNING RESOURCES	REFERENCE	TIME ALLOCATION	REMARKS
13. Use a variety of statistical tools to process and manage numerical data 14. Use the methods of linear regression and correlations to predict the value of a variable given certain conditions 15. Advocate the use of statistical data in making important decisions	Paper and pencil test (quiz) Research study Group term paper Rubrics assessment (final presentation)	Courseware Discussion Problem Solving Case Study Reporting Panel Discussion	**Chapter 2**. MATHEMATICS AS A TOOL (Part I) <u>Lesson 4</u>. Data Management • Basic Statistical Concepts • Measures of Central Tendency • Measures of Dispersion • Measures of Relative Position • Probability and the Normal Distribution • Correlation and Linear Regression • Chi-square	Computer and LCD Projector Lecture Slides	Alejan, et al. (2018). *Mathematics in the modern world.* Mutya Aufmann, et al. (2013). *Mathematical excursions.* Cengage Bian. *Basic Statistics I.* Laerd Statistics. *Measures of Central Tendency.* Laerd Statistics. *Measures of Spread.* Lumen. *Measures of Relative Standing.*	1.5 1.5 1.5 1.5 3.0 2.0 2.0	

INTENDED LEARNING OUTCOME(S) Within the semester, the students are expected to:	ASSESSMENT TASK(S)	TEACHING LEARNING ACTIVITY	CONTENTS	LEARNING RESOURCES	REFERENCE	TIME ALLOCATION	REMARKS
					Khan Academy. *Probability: the Basics*. MathisFun. *Normal Distribution*. Laerd. *Pearson's Product Moment Correlation*. Laerd. *Linear Regression using SPSS Statistics*		
MIDTERM EXAMINATION						2.0	
16. Support the use of mathematics in various aspects and endeavors of life	Paper and pencil test (Quiz) Term Paper	Courseware Case study Reporting	**Chapter 3.** MATHEMATICS AS A TOOL (Part II) <u>Lesson 5</u>. The Mathematics of Finance	Computer and LCD Projector Lecture Slides	Alejan, et al. (2018). *Mathematics in the modern world.* Mutya	1.5	

INTENDED LEARNING OUTCOME(S) Within the semester, the students are expected to:	ASSESSMENT TASK(S)	TEACHING LEARNING ACTIVITY	CONTENTS	LEARNING RESOURCES	REFERENCE	TIME ALLOCATION	REMARKS
			• Simple and compound interest • Credit cards and consumer loans • Stocks, bonds, and mutual funds • Home ownership	RA 9474: Truth in Lending Act Loan Tables	Aufmann, et al. (2013). *Mathematical excursions*. Cengage CMM Project Support: *Simple and Compound Interest* Debt.Org. *How is credit card interest calculated?* Perry (2018). *The Difference Between Stocks vs Bonds vs Mutual Funds*. Pure Financial Advisors WSU Math. *The costs and*	1.5 1.5 1.5	

INTENDED LEARNING OUTCOME(S) Within the semester, the students are expected to:	ASSESSMENT TASK(S)	TEACHING LEARNING ACTIVITY	CONTENTS	LEARNING RESOURCES	REFERENCE	TIME ALLOCATION	REMARKS
					advantages of home ownership		
SEMIFINAL EXAMINATION						2.0	
17. Use coding schemes to encode and decode different types of information for identification, privacy, and security purposes. 18. Exemplify honesty and integrity when using codes for security purposes. 19. Support the use of mathematics in various aspects and endeavors of life	Paper and pencil test (quiz)	Discussion Problem Solving Peer Teaching	Choose 1 from the following lessons: <u>Lesson 6</u>. Codes • Binary Codes • Introduction to Modular Arithmetic • Basic Cryptology <u>Lesson 7</u>. Apportionment and Voting • Introduction to apportionment • Introduction to voting • Weighted voting systems	Lecture Slides Computer and LCD Projector	Alejan, et al. (2018). *Mathematics in the modern world.* Mutya COMAP, Inc. (2011). *For All Practical Purposes: Mathematical Literacy in Today's World* Moser & Chen (2012). *A Student's Guide to Coding and Information Theory.* Cambridge	1.5 3.0 1.5	

INTENDED LEARNING OUTCOME(S) Within the semester, the students are expected to:	ASSESSMENT TASK(S)	TEACHING LEARNING ACTIVITY	CONTENTS	LEARNING RESOURCES	REFERENCE	TIME ALLOCATION	REMARKS
					University Press Rosen (2011). *Elementary Number Theory*. Pearson		
FINAL EXAMINATION						2.0	

Course Requirements:
- Fifty percent (50%) cutoff score
- Satisfactory attendance
- Others as specified in the Course Content

Evaluation Procedure:

Major Examination	-----	40%
Class Standing		
Quizzes	-----	30%
Recitation	-----	20%
Project	-----	10%
TOTAL		**100%**