



OUTCOMES-BASED EDUCATION (OBE) COURSE SYLLABUS

Math 151: Fundamental Concepts of Mathematics

1st Semester, A.Y. 2021-2022

I. UNIVERSITY INFORMATION

1. Vision of the University

A globally competitive university for science, technology, and environmental conservation

2. Mission of the University

Development of a highly competitive human resource, cutting-edge scientific knowledge, and innovative technologies for sustainable communities and environment.

3. VSU Quality Policy Statement

The Visayas State University (VSU), a globally competitive university of science and technology and environmental conservation, is created by law to develop highly competitive human resource, cutting-edge scientific knowledge and innovative technologies for sustainable communities and environment.

Towards this end, we, at the Visayas State University, commit to:

- Produce highly competent, quality and world-class manpower in science and technology, especially for agriculture, environmental management and industry who are proficient in communication skills, critical thinking and analytical abilities;
- Generate and disseminate relevant knowledge and technologies that lead to improved productivity, profitability and sustainability in agriculture, environment and industry; and
- Satisfy the needs and applicable requirements of the industry, the community and government sectors who are in need of quality graduates and technology ready for commercialization through the establishment, operation, maintenance and continual improvement of a Quality Management System (QMS) which is aligned with the requirements of ISO 9001:2015.

It shall be the policy of the university that the quality policies and procedures are communicated to and understood by all faculty, staff, students and other stakeholders and that the system be continually improved for its relevance and effectiveness.


EDGARDO E. TULIN
President
v0 07-16-2019

4. Quality Goals of the College of Arts and Sciences

- Produce quality manpower and graduates in biology, biotechnology, chemistry, English, and statistics to serve the development needs of the region;
- Uplift the economic development of the region thru relevant R & D and extension programs; and
- Enhance regional development of the Visayas for global competitiveness.

5. Quality Objectives of the Department of Mathematics

The Department of Mathematics commits to:

- Offer courses in mathematics aimed at developing students' intellectual curiosity, problem-solving skills, critical thinking, and analytical abilities;
- Offer baccalaureate and graduate degrees in mathematics to produce quality graduates, who satisfy the needs of the industry, the community, and the government sector;
- Provide opportunities for students and faculty to conduct and/or participate in research projects in mathematics and allied fields that lead to the generation of relevant knowledge and technology; and
- Conduct extension projects designed to train professionals in the education of mathematics at all levels.

II. PROGRAM INFORMATION

1. Name of the Program	Bachelor of Science in Mathematics (BSMath)
2. CHED CMO Reference	CMO No. 48, s. 2017
3. BOR Approval	BOR Resolution No. 449, s. 2019

4. Program Educational Objectives and Relationship to Institution Mission

Program Educational Objectives	Mission*		
	a	b	c
1. Produce graduates equipped with enhanced mathematical and critical thinking skills and knowledge, abilities, and insight in mathematics and related fields.	√	√	√
2. Enable students to work as mathematical professionals, or qualify for training as scientific researchers with the ability to translate and synthesize their understanding towards nature, humans, and development.	√	√	√
3. Develop students' ability to utilize mathematical problem-solving methods such as analysis, modeling, and programming and mathematical software applications in addressing practical and heuristic issues.	√	√	√
4. Prepare students for graduate work in mathematics and/or allied fields.	√	√	√

**a - development of a highly competitive human resource, b - cutting-edge scientific knowledge, c - innovative technologies for sustainable communities and environment*

III. COURSE INFORMATION

1. Course Code	Math 151
2. Course Title	Fundamental Concepts of Mathematics
3. Pre-requisite	None

4. Co-requisite	None
5. Credit	3.0 units
6. Semester Offered	First Semester
7. Number of hours	3 hours lecture
8. Course Description	This course covers sets, principles of logic, methods of proof, relations, functions, integers, binary operations, complex numbers, matrices and matrix operations, and an introduction to mathematical systems.

9. Program Outcomes and Relationship to Program Educational Objectives				
Program Outcomes (POs)		Program Educational Objectives		
		1	2	3
a	Articulate and discuss the latest developments in their specific field of practice. (PQF Level 6 descriptor)	√	√	√
b	Effectively communicate orally and in writing using both the English and Filipino languages.	√	√	√
c	Work effectively in multi-disciplinary and multi-cultural teams. (PQF Level 6 descriptor)	√	√	√
d	Demonstrate professional, social, and ethical responsibility, especially in practicing intellectual property rights and sustainable development.	√	√	√
e	Preserve and promote " <i>Filipino historical and cultural heritage</i> " (based on RA 7722).	√	√	√
f	Demonstrate broad and coherent knowledge and understanding in the core areas of the physical and natural sciences and mathematics	√	√	√
g	Apply critical and problem-solving skills using the scientific method.	√	√	√
h	Interpret relevant scientific data and make judgments that include reflection on relevant scientific and ethical issues.	√	√	√
i	Carry out basic mathematical and statistical computations and use appropriate technologies in the analysis of data.	√	√	√
j	Communicate information, ideas, problems, and solutions, both orally and in writing, to other scientists, decision-makers, and the public.	√	√	√
k	Relate science and mathematics to the other disciplines.	√	√	√
l	Design and perform safe and responsible techniques and procedures in laboratory or field practices.	√	√	√
m	Critically evaluate inputs from others.	√	√	√
n	Appreciate the limitations and implications of science in everyday life.	√	√	√
o	Commit to the integrity of data.	√	√	√
p	Gain mastery in the core areas of mathematics: algebra, analysis, and geometry.	√	√	√
q	Demonstrate skills in pattern recognition, generalization, abstraction, critical analysis, synthesis, problem-solving, and rigorous argument.	√	√	√
r	Develop an enhanced perception of the vitality and importance of mathematics in the modern world including inter-relationships within math and its connection to other disciplines.	√	√	√
s	Appreciate the concept and role of proof and reasoning and demonstrate knowledge in reading and writing mathematical proofs.	√	√	√
t	Make and evaluate mathematical conjectures and arguments and validate their own mathematical thinking.	√	√	√
u	Communicate mathematical ideas orally and in writing using clear and	√	√	√

	precise language.			
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10. Course Outcomes (COs) and Relationship to Program Outcomes (POs)																						
After completing this course, the student must be able to perform the following COs:	Program Outcomes Code																					
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	
CO 1: Perform algebra of sets.	E	D				I	D		D	D	E			E	E	D	I	E	E	D		
CO 2: Display mastery of the principles of logic.	E	D				I	E	E	E	D	E			E	E	D	I	D	E	D		
CO 3: Construct proof of mathematical theorems and propositions using different methods of proving.	E	D				I	E	E	E	D	E			E	E	D	I	D	E	D		
CO 4: Discuss the properties of relations and functions.	E	D				I	E		E	D	E			E	E	D	I	D	E	D		
CO 5: Explain the properties of integers.	E	D				I	E		E	D	E			E	E	D	I	D	E	D		
CO 6: Discuss the properties of a mathematical system.	E	D				I	E		E	D	E			E	E	D	I	D	E	D		

Legend: I – Introductory, E – Enabling, D – Demonstrative

Each letter indicates the expected level of competency that each CO should provide for each PO.

11. Course Content and Plan					
Week	Topics	Learning Outcomes	Teaching and Learning Activities		Assessment Tasks
			Teaching Activities	Learning Activities	
Class Orientation					
1	OBE Course Syllabus VSU Vision Mission, and Quality Policy Statement Class Policies Requirements Grading System and	1. State the basic information regarding the course offering. 2. State the VSU Vision, Mission, and Quality Policy. 3. Identify the	Online Mode: Initiate virtual meeting Conduct online orientation	Online Mode: Participation in a virtual meeting Familiarization of	Quiz No. 1 (Essay)

	<p>Activities</p> <p>Learning Guide / Instructional Workbook / Laboratory Manual</p> <p>Submission of requirements</p> <p>Values Integration: Open-mindedness and proper netiquette</p>	<p>class requirements.</p> <p>4. Convey his/her expectation of the course</p> <p>5. Discuss the course policies.</p>	<p>Answer students' questions and clarifications</p> <p>Offline Mode:</p> <p>Incorporate the topics in the Learning Guide</p>	<p>the virtual classroom</p> <p>Asking of questions</p> <p>Setting of expectations</p> <p>Class interaction</p> <p>Sharing of Ideas</p> <p>Feedbacks</p>	
CO 1: Perform algebra of sets.					
1-3	<p>Chapter 1: Sets</p> <p>Lesson 1.1: Basic definitions and notation</p> <p>Lesson 1.2: Set operations, algebra of sets</p> <p>Lesson 1.3: Venn diagrams</p> <p>Lesson 1.4: Counting properties of finite sets</p> <p>Values Integration: Togetherness</p>	<p>1. State the definitions of a set, subset, cardinality of a set, and other terms related to sets.</p> <p>2. Use set notations.</p> <p>3. Perform operations involving sets.</p> <p>4. Recall the laws of the algebra of sets.</p> <p>5. Illustrate set relations using the Venn diagram.</p> <p>6. Use the Venn diagram in solving problems involving sets and set operations.</p> <p>7. Discuss the counting properties of sets.</p>	<p>Online Mode:</p> <p>Upload learning modules to the VSUEE/VC</p> <p>Give supplementary materials in the virtual classroom</p> <p>Suggest online resources</p> <p>Give quizzes, problem sets, and exams</p>	<p>Online Mode:</p> <p>Participation in the regular virtual meeting</p> <p>Asking of questions</p> <p>Class interaction</p> <p>Sharing of Ideas</p> <p>Browsing and studying online resources</p> <p>Online/Offline Mode:</p> <p>Self-study</p> <p>Individual</p>	<p>Exercise Set 1 (Computation, problem-solving, analysis, and proving)</p> <p>Quiz 2 (Objective type)</p> <p>Long Exam 1 (Summative test)</p> <p>Schedule: To be agreed in class</p>

		8. Solve combinatorial problems using the counting properties of sets.		inquiry Do learning tasks for Module 1	
CO 2: Display mastery of the principles of logic.					
4-8	Module 2: Principles of Logic Lesson 2.1: Statements, logical connectives Lesson 2.2: Validity, truth table Lesson 2.3: Tautologies Lesson 2.4: Quantifiers Values Integration: Logical thinking and logical reasoning	1. State the definitions of various terms and concepts in propositional and predicate logic. 2. Classify proposition and simple and compound. 3. Discuss the different logical connectives. 4. Determine the truth values of compound propositions. 5. Translate propositions written in English sentence into symbols. 6. Classify a proposition as tautology, contradiction, or contingency using truth tables. 7. Discuss the validity of an argument. 8. Construct a formal proof of validity of an argument. 9. Prove the	Online Mode: Upload learning modules to the VSUEE/V C Give supplementary materials in the virtual classroom Suggest online resources Give quizzes, problem sets, and exams	Online Mode: Participation in the regular virtual meeting Asking of questions Class interaction Sharing of Ideas Browsing and studying online resources Online/Offline Mode: Self-study Individual inquiry Do learning tasks for Module 2	Exercise Set 2 (Computation, problem-solving, analysis, and proving) Quiz 3(Objective type) Long Exam 2 (Summative test) Schedule: Midterm Examination Week

		invalidity of an argument. 10. Prove argument using the rules of conditional and indirect proof. 11. Differentiate existential and universal quantifiers. 12. Determine the truth value of statements bound using quantifiers. 13. Prove validity of arguments involving quantifiers.			
9	Midterm Examination Week				
CO 3: Construct proof of mathematical theorems and propositions using different methods of proving.					
10-11	Module 3: Methods of Proof Lesson 3.1: Direct proof Lesson 3.2: Indirect proof Lesson 3.3: Proof by specialization and division into cases Lesson 3.4: Mathematical induction Values Integration: Open-mindedness and teachability	1. Discuss the different methods of proof. 2. Compare and contrast the different methods of proof. 3. Use different methods of proving to prove mathematical statements.	Online Mode: Upload learning modules to the VSUEE/VC Give supplementary materials in the virtual classroom Suggest online resources Give quizzes, problem sets, and	Online Mode: Participation in the regular virtual meeting Asking of questions Class interaction Sharing of Ideas Browsing and studying online resources Online/Offline	Exercise Set 3 (Computation, problem-solving, analysis, and proving) Quiz 4 (Objective type) Long Exam 3 (Summative test) Schedule: To be agreed in class

			exams	Mode: Self-study Individual inquiry Do learning tasks for Module 3	
CO 4: Discuss the properties of relations and functions.					
12-13	Module 4: Relations and Functions Lesson 4.1: Equivalence relations, equivalence classes and partitioning Lesson 4.2: Partial ordering Lesson 4.3: Functions Lesson 4.4: Cardinal number of a set, countable and uncountable sets Values Integration: Open-mindedness and teachability	1. Define relation, equivalence relation, and partitioning. 2. Determine whether a relation is an equivalence relation. 3. Define a function, one-to-one function, onto function, and inverse function. 4. Discuss the cardinal number of a set, countable, and uncountable sets.	Online Mode: Upload learning modules to the VSUEE/V C Give supplementary materials in the virtual classroom Suggest online resources Give quizzes, problem sets, and exams	Online Mode: Participation in the regular virtual meeting Asking of questions Class interaction Sharing of Ideas Browsing and studying online resources Online/Offline Mode: Self-study Individual inquiry Do learning tasks for Module 4	Exercise Set 4 (Computation, problem-solving, analysis, and proving) Quiz 5 (Objective type) Long Exam 4 (Summative test) Schedule: To be agreed in class

CO 5: Explain the properties of integers.					
14-15	Module 5: Integers Lesson 5.1: Divisibility Lesson 5.2: Division algorithm, Euclidean algorithm Lesson 5.3: Fundamental Theorem of Arithmetic Values Integration: Open-mindedness and teachability	1. State the Division algorithm and the definition of divide, multiple, factor, and prime. 2. Use Euclidean algorithm and to find the least common multiple of two integers. 3. Recall the Fundamental Theorem of Arithmetic.	Online Mode: Upload learning modules to the VSUEE/V C Give suppleme ntary materials in the virtual classroom Suggest online resources Give quizzes, problem sets, and exams	Online Mode: Participati on in the regular virtual meeting Asking of questions Class interactio n Sharing of Ideas Browsing and studying online resources Online/O ffl ine Mode: Self-study Individual inquiry Do learning tasks for Module 2	Exercise Set 5 (Computati on, problem- solving, analysis, and proving) Quiz 6 (Objective type) Long Exam 5 (Summative test) Schedule: To be agreed in class
CO 6: Discuss the properties of a mathematical system.					
16-17	Module 6: Introduction to Mathematical Systems Lesson 6.1: Binary operations Lesson 6.2:	1. State the definition binary operations. 2. Perform modular operations, matrix	Online Mode: Upload learning modules to the VSUEE/V C	Online Mode: Participati on in the regular virtual meeting	Exercise Set 6 (Computati on, problem- solving, analysis, and proving)

	Modular operations, operations on matrices, operations on complex numbers Lesson 6.3: Semigroup, group, ring, field Values Integration: Open-mindedness and teachability	operations, and operations on complex numbers. 3. Discuss a mathematical system. 4. Define semigroup, group, ring, and field	Give supplementary materials in the virtual classroom Suggest online resources Give quizzes, problem sets, and exams	Asking of questions Class interaction Sharing of Ideas Browsing and studying online resources Online/Offline Mode: Self-study Individual inquiry Do learning tasks for Module 6	Quiz 7(Objective type) Long Exam 6 (Summative test) Schedule: Final Examination Week
18	Final Examination Week				
* VSUEE/VC – VSU E-Learning Environment/ Virtual Classroom					
12. Life-long Learning Opportunities The course prepares students to have a strong background in mathematics and skills in critical thinking, problem solving, and use of technology so that upon graduation they can matriculate successfully and competitively in graduate school or industry. It also trains students to be future mathematicians who have a vision of mathematics, including its usefulness in technology, and who have learned to reason mathematically in their search for truth. By doing so, students will develop skills for life-long learning, and provides a challenging university experience consistent with the vision and mission of the institution					
13. Contribution of Course to Meeting the Professional Component (%)					
General Education: 0% Basic Education (<i>Foundation</i>): 0% Core Course: 100%					
14. References and Other Learning Resources A. Textbook(s)/ E-Books None					

B. Other Learning Resources

Beachy, John A. and William D. Blair (2019). *Abstract Algebra*, (4th ed.) Waveland Pr Inc

Chartrand, Gary, Polimeni, Albert D., and Zhang, Ping (2013). *Mathematical Proofs: A Transition to Advanced Mathematics*, (3rd ed.) Pearson Education.

Copi, Irving M., Cohen Carl, McMahon, Kenneth. (2014). *Introduction to Logic*, (14th ed.) USA: Pearson Education Limited

Fraleigh, J. B., & Katz, h. n. (2003). *A First Course in Abstract Algebra* (7th ed.). USA: Pearson Education, Inc.

Gallian, J. (2015). *Contemporary Abstract Algebra* (9th ed.). Belmont, CA, USA: Brooks/Cole, Cengage Learning.

Gerstein, Larry J. (2012). *Introduction to Mathematical Structures and Proofs*, (2nd ed.) Springer.

Hurley, Patrick J. (2000). *A Concise Introduction to Logic*, (7th ed.) Belmont, CA: Wadsworth Pub.

Morash, Ronald P. (1987). *Bridge to Abstract Mathematics*, (1st ed.) Random House, Inc., New York.

Pinter, Charles C., (2014), *A Book of Set Theory*. Dover Publications, Inc. Mineola, New York.

Rotman, Joseph J. (2013). *Journey into Mathematics: An Introduction to Proofs*, (reprint) Courier Corporation

Sundstrom, Theodore A. (2017). *Mathematical Reasoning: Writing and Proof*, Creative Commons

15. Course Assessment and Evaluation

The performance of students will be assessed and evaluated based on the following:

Item No,	Assessment Tasks	Percentage Contribution (1)	No. of Times in the Semester (2)	Individual Task % Contribution (1/2)
1	Exercise Sets (ES)	20%	6	3.33%/PE
3	Quizzes	20%	7	2.86%/Q
4	Long Examinations (LE)	60%	6	10%/LE
		100%		

COs	Assessment Tasks	Weight in Percent	Minimum Average for Satisfactory Rating	Target and Standards
CO 1	ES 1	3.33%	60 %	At least 70% of the students have at least 60% score
	Quiz 2	2.86%		
	LE 1	10%		
CO 2	ES 2	3.33%	60 %	
	Quiz 3	2.86%		
	LE 2	10%		
CO 3	ES 3	3.33%	60 %	
	Quiz 4	2.86%		

	LE 3	10%		
CO 4	ES 4	3.33%	60 %	
	Quiz 5	2.86%		
	LE 4	10%		
CO 5	ES 5	3.33%	60 %	
	Quiz 6	2.86%		
	LE 5	10%		
CO 6	ES 6	3.33%	60 %	
	Quiz 7	2.86%		
	LE 6	10%		
TOTAL		100%	60%	

Grading System (Passing: 60%)

Range	Grade	Range	Grade
96-100	1.00	68 - 71	2.50
92-95	1.25	64 - 67	2.75
88-91	1.50	60 - 63	3.00
84-87	1.75	50 - 59	3.25
80-83	2.00	40 - 49	3.50
76-79	2.25	30 - 39	4.00
72-75	2.50	01 - 29	5.00

16. Course Policies

- The official virtual classroom is VSU E-Learning Portal (<https://elearning.vsu.edu.ph>). A class orientation will be done in relation to the use and navigation of the platform.
- ZOOM or Google Meet will be used for web-conferencing and real-time class meetings. Username and password link will be posted in VSU E-Learning Portal.
- Attending the virtual meeting is highly – encouraged. Attendance in online classes will be checked. If you cannot attend due to internet connection limitation, just keep up with the lessons by watching the recording of the online class and do all the necessary exercises that is required of you.
- The virtual meeting is our avenue for synchronous learning. Class interaction and participation is encouraged, sharing of ideas, giving feedbacks of your outputs and other related concerns in the subject will be done during this time.
- All written outputs should be submitted in pdf format and send them through the VSU E-Learning Portal. For submissions, use the following template in naming your files:

DELA CRUZ, PEDRO_Math151_Exercise 1.1
DELA CRUZ, PEDRO Math151_Long Exam 1
- Quizzes is set on VSU E-Learning Portal. All quizzes are announced and will open and close on the agreed schedule. Schedule of quizzes will be announced in advance by the faculty.
- In the submission of activities ON-TIME submission is encouraged. At least one week will be given for you to work on your exercises.
- Long examinations and term examinations are required and will be done through the VSU E-Learning Portal.

- i. If you have any inquiries/clarifications, you may contact the course instructor during official class schedule; or the official online consultation schedule (2:00 – 4:00, MWF).
- j. All students are reminded to observe all policies, regulations, and rules of the university and other related laws of the land and are advised to read, understand, and practice the provisions of the VSU Student Manual.
- k. Lastly, as we embark in this “new normal”. Let us have an open mind and heart as we adjust in this new way of delivering the teaching-learning process and still continue to aim for quality in education.

This class policy serves as our written agreement for the whole semester. If there are any changes to enhance the class learning opportunity within the semester, it will be communicated accordingly.

17. Course Materials and Facilities Available

Virtual Classroom which contains learning materials, learning resources, learning tasks, assessment tasks, etc.

18. Revision History

Revision number	Date of Revision	Date of implementation	Highlights of Revision
00		August 23, 2021	

19. Preparation

	Name	Signature	Date Signed
Prepared by:	EUSEBIO R. LINA, JR.		

III. INSTRUCTOR/PROFESSOR INFORMATION

1. Name of Instructor/Professor	Eusebio R. Lina, Jr.
2. Office and Department	Department of Mathematics
3. Telephone/Mobile Numbers	09293697060
4. Email Address	eusebio.lina@vsu.edu.ph
5. Consultation Time	2:00 – 4:00 MWF

20. Department Instructional Materials Review Committee:

Committee	Name	Signature	Date Signed
Member:	JORGE S. VALENZONA		
Member:	RAYMUND M. IGCASAMA		
Member:	LEOMARICH F. CASINILLO		
Chairperson:	DIVINA L. VALENZONA		

	Name	Signature	Date Signed
Verified by:	MA. THERESA P. LORETO Dean, CAS		
Validated by:	NANCY D. ABUNDA Head, OIMD		

Note:

- 1) The number of POs will depend on each degree program offered
- 2) COs and Relationship to POs
 - a. (I) - **Introductory** – an Introductory Course to an outcome
 - b. (E) - **Enabling** – an Enabling Course or a course that strengthens the outcome
 - c. (D) - **Demonstrated** – a Demonstrative Course or a course demonstrating an outcome.

Distribution of copies: OIMD, College, Department, Faculty, and ODQA