DEPARTMENT OF MATHEMATICS
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VISAYAS STATE UNIVERSITY

OUTCOMES-BASED EDUCATION (OBE) COURSE SYLLABUS
Math 125n: Calculus 3
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

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4. Quality Goals of the College of Arts and Sciences

    a) To produce quality manpower and graduates in biology, biotechnology, chemistry, English, liberal arts and behavioral sciences, mathematics, physics, and statistics to serve the development needs of the region.

    b) To uplift the economic well-being of the region through relevant R and D and extension programs.

    c) Enhance regional development of the Visayas for global competitiveness.

5. Quality Objectives of the Department of Mathematics

The Department of Mathematics commits to:

    a) Offer courses in mathematics aimed at developing students' intellectual curiosity, problem-solving skills, critical thinking, and analytical abilities;

    b) Offer baccalaureate and graduate degrees in mathematics to produce quality graduates, who satisfy the needs of the industry, the community, and the government sector;

    c) 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

    d) 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 Secondary Education (Major in Mathematics)
2.	CHED CMO Reference	CMO No. 75, s. 2017
3.	BOR Approval	BOR Resolution No. 68, s. 2018

4. Program Educational Objectives and Relationship to Institution Mission

Program Educational Objectives	Mission*		
	a	b	c
1. Develop among prospective teachers' strong commitment to teaching and a real concern for the welfare and development of the learners.	√		√
2. Produce graduates equipped with professional, pedagogical, and critical thinking skills	√	√	√
3. Provide students the opportunity to formulate and conduct research on relevant areas and undertake community outreach projects.	√	√	√

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 125n
2. Course Title	Calculus III
3. Pre-requisite	Math 124 (Calculus II)
4. Co-requisite	None
5. Credit	3 units
6. Semester Offered	First Semester

7. Number of hours	3 hours lecture
8. Course Description	This course aims to provide the students with an understanding of the applications of differentiation and integration in sequences, infinite series, power series, as well as multiple integration for functions in several variables. Moreover, the students will be able to apply these concepts to problem-solving.

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 the specific field of practice. (PQF level 6 descriptor)	√	√	√
b	Effectively communicate in English and Filipino, both orally and in writing.	√	√	√
c	Work effectively and collaboratively with a substantial degree of independence in multi-disciplinary and multi-cultural terms. (PQF level 6 descriptor)	√	√	√
d	Act in recognition of professional, social, and ethical responsibility.	√	√	√
e	Preserve and promote "*Filipino historical and cultural heritage*" (based on RA7722).	√	√	√
f	Articulate the rootedness of education in philosophical, socio-cultural, historical, psychological, and political contexts.	√	√	√
g	Demonstrate mastery of subject matter/discipline.	√	√	√
h	Facilitate learning using a wide range of teaching methodologies and delivery modes appropriate to specific learners and their environments.	√	√	√
i	Develop innovative curricula, instructional plans, teaching approaches, and resources for diverse learners.	√	√	√
j	Apply skills in the development and utilization of ICT to promote quality, relevant, and sustainable educational practices.	√	√	√
k	Demonstrate a variety of thinking skills in planning, monitoring, assessing, and reporting learning processes and outcomes.	√	√	√
l	Practice professional and ethical teaching standards sensitive to the local, national, and global realities.	√	√	√
m	Pursue lifelong learning for personal and professional growth through varied experiential and field-based opportunities.	√	√	√
n	Exhibit competence in mathematical concepts and procedures.	√	√	√
o	Exhibit proficiency in relating mathematics to other curricular areas.	√	√	√
p	Manifest meaningful and comprehensive pedagogical content knowledge (PCK) of mathematics.	√	√	√
q	Demonstrate competence in designing, constructing, and utilizing different forms of assessment in mathematics.	√	√	√
r	Demonstrate proficiency in problem-solving by solving and creating routine and non-routine problems with different levels of complexity.	√	√	√
s	Use effectively appropriate approaches, methods, and techniques in teaching mathematics including technological tools.	√	√	√
t	Appreciate mathematics as an opportunity for creative work, moments of enlightenment, discovery, and gaining insights into the world.	√	√	√

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
CO 1: Use integration to find the volume of a solid of a revolution and solve problems in probability.	E	D	E				D	I	I	E	I			D	I	D	E	D	I	E
CO 2: Demonstrate mastery of the theorems and results regarding infinite sequence and series.	E	D	E				D	I	I	E	I			D	I	D	E	D	I	E
CO 3: Do calculus of functions of several variables.	E	D	E				D	I	I	E	I			D	I	D	E	D	I	E
CO 4: Use several methods to solve different types of differential equations	E	D	E				D	I	I	E	I			D	I	D	E	D	I	E
CO5: Discuss vectors and vector-valued functions. (Time-permitting)	E	D	E				D	I	I	E	I			D	I	D	E	D	I	E

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 Activities Learning Guide / Instructional Workbook / Laboratory Manual Submission of requirements Values Integration: Open-mindedness and proper netiquette	1. State the basic information regarding the course offering. 2. State the VSU Vision, Mission, and Quality Policy. 3. Identify the class requirements. 4. Convey his/her expectation of the course 5. Discuss the course policies.	**Online Mode:** Initiate virtual meeting Conduct online orientation Answer students questions and clarifications **Offline Mode:** Incorporate the topics in the Learning	**Online Mode:** Participation in the virtual meeting Familiarization of the virtual classroom Asking of questions Setting of expectations Class interaction	Quiz No. 1 (Essay)

			Guide	Sharing of Ideas Feedbacks	

CO 1: Use integration to find the volume of a solid of a revolution and solve problems in probability.

			Online Mode: Upload learning modules to the VSUEE/VC Give supplementary materials in the virtual classroom Give quizzes, problem sets, and exams	Online Mode: Participation in the virtual meeting Asking of questions Class interaction Sharing of Ideas Feedbacks **Online/Offline Mode:** Self-study Individual inquiry Do learning tasks for Module 1	Exercise Set 1 (Computation, proving, problem-solving) Long Exam 1
2-3	**Module 1:** **Applications of Integration** **Lesson 1.1:** Volume **Lesson 1.2:** Probability Values Integration: Patience and positive attitude	1. Compute the volume of a solid using the method of slicing. 2. Find the volume of a solid of a revolution using the disk, washer, and shell methods. 3. Use integral to compute the probability.			

CO 2: Demonstrate mastery of the theorems and results regarding infinite sequence and series.

4-6	**Module 2:** **Infinite Sequence and Series** **Lesson 2.1:** Sequence, Series, and Convergence **Lesson 2.2:** Series Convergence Tests **Lesson 2.3:** Power Series	1. Define sequence and series. 2. Discuss results regarding sequence and series. 3. Determine whether a sequence converges or diverges. 4. Discuss the different tests	Online Mode: Upload learning modules to the VSUEE/VC Give supplementary materials	Online Mode: Participation in the virtual meeting Asking of questions Class interaction	Quiz (Objective Type) Exercise Set 2 (Computation, proving, problem-solving) Long Exam 2

	Lesson 2.4: Taylor and Maclaurin Series Values Integration: Orderliness and regularity	for convergence of series. 5. Determine whether an infinite series converges of diverges using different tests for convergence. 6. Define a power series. 7. Represent functions by power series. 8. Find the radius and interval of convergence of power series. 9. Differentiate and integrate power series. 10. Find a Taylor or Maclaurin polynomial approximations of elementary functions. 11. Find a Taylor or Maclaurin series for a function	in the virtual classroom Give quizzes, problem sets, and exams	Sharing of Ideas Feedbacks **Online/Off line Mode:** Self-study Individual inquiry Do learning tasks for Module 2	

CO 3: Do calculus of functions of several variables.

7 - 8	**Module 3: Multivariable Calculus** **Lesson 5.1:** Functions of Several Variables **Lesson 5.2:** Limits and Continuity **Lesson 5.3:** Partial Derivatives Values Integration: Open-mindedness	1. Define a function of several variables. 2. Sketch a graph, level curves, and level surfaces. 3. Define the limit and continuity of multivariable functions. 4. Find a limit and determine the continuity of multivariable functions. 5. Find and use partial derivative. 6. Use the Chain Rules and find a partial derivative implicitly.	**Online Mode:** Upload learning modules to the VSUEE/VC Give supplementary materials in the virtual classroom Give quizzes, problem sets, and exams	**Online Mode:** Participation in the virtual meeting Asking of questions Class interaction Sharing of Ideas Feedbacks **Online/Off line Mode:** Self-study	Quiz (Objective Type) Exercise Set (Computation, Problem Solving Long Exam 3

				Individual inquiry Do learning tasks for Module 3	
9	**Midterm Examination Week**				
10-11	**Module 3:** **Multivariable Calculus** **Lesson 5.4:** Multiple Integration **Lesson 5.5:** Finding Area and Volume Using Multiple Integration	7. Define double and triple integrals. 8. Evaluate an iterated integral and find the area of a plane region. 9. Use a double integral to find a volume of a solid region. 10. Write and evaluate double integrals in polar coordinates.			

CO 4: Use several methods to solve different types of differential equations.

12-15	**Module 4:** **Introduction to Differential Equations** **Lesson 4.1:** Slope Fields and Euler's Method **Lesson 4.2:** Differential Equations: Growth and Decay **Lesson 4.3:** Separation of Variables and the Logistic Equation **Lesson 4.4:** First-order Linear Differential Equations Values Integration: Teachability	1. Sketch a slope field of a differential equation and find a particular solution. 2. Use an exponential function to model growth and decay. 3. Use separation of variables to solve a differential equation. 4. Solve a first-order differential equation and a Bernoulli differential equation.	**Online Mode:** Upload learning modules to the VSUEE/VC Give supplementary materials in the virtual classroom Give quizzes, problem sets, and exams	**Online Mode:** Participation in the virtual meeting Asking of questions Class interaction Sharing of Ideas Feedbacks **Online/Offline Mode:** Self-study Individual inquiry Do learning	Quiz (Objective Type) Exercise Set (Computation, Problem Solving) Long Exam 4

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					tasks for Module 4	

CO5: Discuss vectors and vector-valued functions.					

| | | Module 5: **Vectors and Vector-valued Functions**

Lesson 5.1: Vectors in Plane

Lesson 5.2: Vector-Valued Functions

Lesson 5.3: Differentiation and Integration of Vector-Valued Functions | 1. Write vectors, perform basic vector operations, and represent vectors graphically
2. Plot points in a three-dimensional coordinate system
3. Analyze vectors in space
4. Find the dot product and cross product of two vectors
5. Find equations of lines and planes in space and sketch their graphs
6. Recognize and write equations of cylindrical and quadratic surfaces and surfaces of revolution
7. Use cylindrical and spherical coordinates to represent surfaces in space
8. Analyze and sketch a space curve represented by a vector-valued function
9. Apply the concepts of limits and continuity of vector-valued functions
10. Differentiate and integrate vector-valued functions | **Online Mode:**

Upload learning modules to the VSUEE/VC

Upload recordings of online classes

Give supplementary materials in the virtual classroom

Give quizzes, problem sets, and exams | **Online Mode:**

Participation in an online synchronous class

Asking of questions

Class interaction

Sharing of Ideas

Feedbacks

Online/Offline Mode:

Self-study

Individual inquiry

Do learning tasks for Module 5 | Quiz (Objective Type)

Exercise Set (Computation, Problem Solving)

Long Exam 5 |
| 16-17 | | | | | | |

18	**Final Examination Week**

* VSUEE/VC – VSU E-Learning Environment/ Virtual Classroom

12. Life-long Learning Opportunities

In this subject, students will learn the value of hard work, dedication, patience, and being independent as they progress in acquiring knowledge and skills in solving individually various mathematical concepts, principles, and applications inside and outside the classroom. They will also learn the importance of teamwork as they continue to be involved in group classwork exercises as well as solving various exercises. The gained knowledge, skills, and attitudes from this subject will become a catalyst of success in their future endeavors. In particular, the students will develop 21st-century skills in becoming performing, effective and efficient teachers.

13. Contribution of Course to Meeting the Professional Component (%)

General Education: 0%
Basic Education *(Foundation):* 0%
Professional Education (*Major Field):* 0%
Major Course: **100**%

14. References and Other Learning Resources

A. Textbook(s)/ E-Books
   None
B. Other Learning Resources

Dawkins, P. (2017, October 30). *Calculus II*. Retrieved July 2020, from Paul's Online Math Notes: https://tutorial.math.lamar.edu/Classes/CalcII/CalcII.aspx

Khan Academy. (2020). *AP®/College Calculus BC*. Retrieved August 2020, from Khan Academy: https://www.khanacademy.org/math/ap-calculus-bc

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Larson, R., & Edwards, B. (2016). *Calculus* (10th ed.). Singapore: Cengage Learning.

Larson, R., Hostetler, R. P., & Edwards, B. H. (2002). *Calculus of a Single Variable* (7th ed.). Boston/New York: Houghton Company.

Leithold, L. (1996). *The Calculus 7* (7th ed.). Pennsylvania State University: HarperCollins College Publishing.

Stewart, J. (2003). *Calculus* (5th ed., Vol. 1). Pennsylvania State University: Thomson Brooks/Cole.

Stewart, J. (2008). *Single Variable Calculus: Early Transcendentals* (6th ed.). USA: Thomson Brooks/Cole.

Svirin, A. (n.d.). *Calculus*. Retrieved July 2020, from math24.net: https://www.math24.net/topics-calculus/

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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%	5	4%/PE
2	Quizzes (Q)	20%	4	5%/Q
3	Long Examinations (LE)	60%	5	12%/LE
		100%		

COs	Assessment Tasks	Weight in Percent	Minimum Average for Satisfactory Rating	Target and Standards
CO 1	ES 1	4%	60 %	
	LE 1	12%		
CO 2	ES 2	4%	60 %	
	Q 1	5%		
	LE 2	12%		
CO 3	ES 3	4%	60 %	At least 70% of the students have at least a 60% score
	Q 2	5%		
	LE 3	12 %		
CO 4	ES 4	4%	60 %	
	Q 3	5%		
	LE 4	12 %		
CO 5	ES 45	4%	60 %	
	Q 4	5%		
	LE 5	12 %		
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

a. The official virtual classroom is VSU E-Learning Portal (https://elearning.vsu.edu.ph). A class orientation will be done concerning the use and navigation of the platform.

b. ZOOM or Google Meet will be used for web-conferencing and real-time class meetings. The username and password link will be posted in VSU E-Learning Portal or emailed to your respective email addresses.

c. Attending the virtual meeting is highly encouraged but not compulsory. If you cannot attend due to internet connection limitations, there is no problem. Just keep up with the lessons by watching the online class recording and doing all the necessary exercises

that are required of you.

d. The virtual meeting is our avenue for synchronous learning. Class interaction and participation are encouraged; sharing ideas, giving feedback on your outputs, and other related concerns will be done during this time.

e. All written outputs should be submitted in pdf format and sent through the VSU E-Learning Portal.

f. Quizzes are set on VSU E-Learning Portal. All quizzes are announced and will open and close on the agreed schedule. The schedule of quizzes will be announced in advance by the faculty.

g. In the submission of activities, ON-TIME submission is encouraged. At least one week will be given for you to work on your exercises.

h. 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 the official class schedule; or the official online consultation schedule (9:00 – 11:00 AM, 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 on this "new normal," let us have an open mind and heart as we adjust to this new way of delivering the teaching-learning process and still aim for quality 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, they 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		October 5, 2020	
01		August 23, 2021	• Updated course content and grading system

19. Preparation

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

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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	9:00 – 11:00 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.